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REVIEWS.

Abram's Flora of Los Angeles.

Abrams Flora p. 446. Abrams does not see that his figures are drawn correctly. Yucca brevifolia is figured as having thin perianth oblately spherical. The parts are never thin but are conspicuously fleshy and thick and oblong. Flowers never spherical, but very irregular. His figure of Yucca Mohavensis is equally bad. No such flowers are found, but they are almost exactly like those of Y. baccata, that is, pear-shaped. In his treatment of Allium I find the same lack of precision in handling the species, and little discrimination in synonymy. He shows a complete ignorance of Allium monticola Davidson which is a good species related to A. bisceptrum and always alpine, while A. Parishii, to which he refers it was got on the alkaline slopes of Cushenbury spring in the Tropical life zone, and is quite a different thing, and probably A. fimbriatum. His reference of my A. decipiens and Inyonis to A. atrorubens is equally erroneous. He has never seen the type of either. He never seems to have ever seen A. Nevadense, a very marked species, for he figures it as having a slender and straight single leaf, while the species has a stout and glaucuous involute leaf, conspicuously coiled at tip, and very marked bulb coats. He seems to know nothing about the peculiar root characters of A. bisceptrum and campanulatum. He uses no discrimination in his treatment of the serratum group, following Jepson in his error as to the identity of A. serratum, which appears to be A. peninsulare Lemmon. He keeps up the various forms in this group as species. His figure of A. acuminatum shows that he does not know the peculiar structure of the reticulations. He keeps up the untenable divisions of the Douglasii group. He does not follow any genetic system in the arrangement of species except to use my general system. He seems to know little of the root structure of any of the species or their method of reproduction which in many instances is very peculiar. Abrams is not in any proper sense a botanist, nor has he any right to attempt a flora of anything, for he has no sympathy with floriculture or flowers. His treatment is more that of a mathematician or bibliographer, and with little if any initiative. He has not made it a business to know plants in their homes or to understand the ecological conditions which govern their distribution. His Flora of Los Angeles is the poorest attempt at a text book on the plants of any region that I have ever seen.

JEPSON'S FLORA OF CALIFORNIA

This is coming out in two simultaneous forms. A full flora, supposed to be complete in all things, and an abridged school flora, in one volume.

Jepson seems to be the best equipped for this work of any of the younger botanists, though not to be compared in ability with the venerable Parish nor with the Brandegees, who have just died. Jepson seems to have in the main done his task well. There are many minor things to criticise, such as incomplete symphony, omission of many proposed species, poor identification and an inclination to neglect the work of contemporaries, but in the main his work deserves and will get the proper recognition. His ideas on the nomenclature are betwixt and between, a defect. He fails to print the names of species as they were originally proposed. Those names ending in one or two i-s he generally prints with two irrespective of their etymological significance, apparently assuming that his readers know as little or less Latin than he, which is very little. He also drops the capitalization of proper names which is a serious defect. If a reader has not sense enough to study Latin' I fail to see why he ever becomes a botanist. I don't think it fair to real botanists to assume that all of them are Latinistical idiots. That there are many who rightly belong in the class of half-wits who call themselves botanists does not need proof, but all botanists do not belong in the class of the feeble minded. Another defect of Jepson's is lack of knowledge of the material in the great herbaria of this country, and this leads him to make multitudinous mistakes in ecology and plant distribution. An example of his neglect of proper study of genera is shown in Draba. His Draba nivalis var. Californica is not that species. He does not mention Draba subsessilis though the type locality is Californian. He does not mention Draba incana which grows in California. He fails to name the chief character of Draba corrugata which is the conspicuously exserted stamens, which character does not occur in any other species of Draba. There are several species of Draba in the Sierras which he does not mention. Time prevents my going through his work and picking up the lapses, but they are many. On the whole his Flora is the best ever gotten out except Watson's monumental work. In Jepson's Manual P. 444 he gives Draba Lemmoni as D. Lemmonii with the accent on the "o." This plant was described as Draba Lemmoni by Watson in his Flora of California. In the Syn. Fl. p. 108 Robinson puts the accent in the wrong place by accenting the "o." Lemmon's name was not pronounced with the "o" long but short, and therefore the accent should be on the "e." That Jepson is simply negligent in the use of the "i-s" is shown by his not giving two of them in Draba Breweri. There was no regularity in the use of two or one "i-s"

by Watson or Gray but I see no reason why we should not follow the names as they were printed in the first place. On page 430 he also misspells Arabis Lemmoni. On the next he misspells Arabis perennans.

Another illustration of Jepson's carelessness is found on page 635 of his manual, where he publishes Sphaeralcea purpurea Parish (a species never published) and cites Sphaeralcea violacea Munz & Johnson (a species never published) as a synonum. Munz & Johnston published Sphaeralcea rosacea in Torr. Bull. 49 353 1922, which is this species.

On page 633 Jepson omits mention of Malvastrum Clementinum Munz & Johnston, and Malvastrum orbiculatum Greene. He also confuses Malvastrum Davidsonii and orbiculatum. Davidsonii is a tall plant ten to fifteen feet high growing in the San Fernando valley only, while he credits it to the San Gabriel mountains, where only orbiculatum grows. It should be noted that Jepson merges Malvastrum into Sphaeralcea.

On page 692 Jepson publishes Erodium circutarium and also repeats the error in his index. It should be cicutarium.

On page 871 Jepson publishes Salvia Vaseyi Jepson n. comb., but this species was published by Parish in Muhlenbergia 3 126 1907 as Salvia Vaseyi (Porter) Parish. Audibertia Vaseyi Porter Bot. Gaz. 6 267 1881.

On page 901 Jepson publishes Mohavea confertiflora Jepson n. comb. but this was first published by Heller in Muhlenbergia 8 48 1912 as Mohavea confertiflora (Bentham) Heller. Antirrhinum confertiflorum in DC. Prod. 10 592 1846. These and other numerous citations show either gross carelessness or deliberate ignoring of well known previous publications.

On page 402 Jepson makes the stock blunder, copied from the Synoptical Flora Robinson p. 90, probably where Eschscholtzia Californica is described as a perennial. A very slight acquaintance with the botanical garden would have told him that it is never a perennial but a biennial blooming the first year. I have grown the plant in my garden for six years, and know what I am writing about. If there are any perennial forms I have not yet met the person who has seen them.

All through the manual, wherever you encounter the termination "cola," Jepson invariably gives it a gender (a us or um), according to the gender of the genus. He evidently does not know that cola is a Greek masculine noun and should always end in a. P. 731 Cymopterus deserticolus. Agrapyron saxicola, Arctostaphylos glauca var. eremicola, Arenaria paludicola, Astragalus deserticolus, Calochortus Palmeri var. paludicolus, Carex praticola, tumulicola, Cymopterus deserticolus, Dendromecon rigida (mecon is neuter and the specific name should be rigidum). Eleocharis monticola, Eriogonum Siskiyouensis should end in "se," but a name that Gray should have balked at, Euphorbia arenicola, Potentilla glandu-

losa var. monticola, Sphaeralcea eremicola. Thelypodium lasiophyllum. I never have been able to understand how Greene buncoed the botanical world into placing Sisymbrium reflexum in Thelypodium. This is Thelypodium lasiophyllum. It is a Sisymbrium in every particular except that it has the septum of Thelypodium, just as Thelypodium elegans has the septum of Sisymbrium, while Thelypodium ovalifolium Rydberg has both septums on the type specimen. Greene, with his usual bluff, in Torr. Bull. 13, tried to make out that this was a typical Thelypodium, known as such to every acute botanist, which was the usual bunk he got off to strengther, a weak position, but why he made this bluff stick, even on Harvard, is a mystery..

On page 1008 Jepson makes an egregious blunder in merging Glyptopleura setulosa with G. marginata. They are conspicuously different.

Jepson's tendency to follow the aberrations of Rose & Coulter in the Umbelliferae is marked, while he goes them one better in several cases in the erection of new genera such as Oreonana which I think is better placed in Velaea. He keeps up the untenable Lomatium Raf. instead of Cogswellia. He does well in keeping up Cymopterus. He follows the vagaries of Greene in Gilia splitting. I don't like his handling of Dodecatheon.

He does not seem to know the habitat of Parishella, which is the dry beds where water collects on the deserts, but not alkaline places. It is frequent along with Lepidium flavum, on the road to Randsburg south of the rail oad from Adelanto north.

Tricardia Watsoni he gives as "hill slopes and canons," which does not mean anything. It is always found growing under the protection of brush, as though eaten off elsewhere by stock, and in gravelly or sandy places on slopes, or edges of washes in dry places. Its roots resemble those of Mertensia being covered by black papery sheets or shreds. On drying it always turns black, including the lurid flowers, which are whitish to low and purple edged.

In Jepson's preface he gives the current opinion about the insular flora of California, which has arisen from fantastic theories of amateur geologists. In recent years there has been a careful study hydrographic and otherwise to determine the facts in the origin of the islands. The data accumulating from these studies point rather unmistakably toward the conclusion that there never was a land connection between the islands and the shore and that the present flora is based on wind, water, and animal transportation, a slow process, and that the endemic species peculiar to the islands (which are few) are the product of such isolation. I have made several trips to the islands to secure data on this subject, and in no case have I ever found any geological evidence to warrant a land connection. The evidence to the contrary is much. There are no extensive sea beaches around any of the islands to show that their flora has been the assumed

emergence and subsidence of island masses, in fact there are almost no beaches at all, which shows that the emergence of the islands has been rapid and recent. Practically all the islands are volcanic or of highly altered schists and volcanic flows, indicating their cause to have been lateral pressure in ocean sediments some twenty miles out from the shore, causing the usual uplifts, foldings and metamorphoses which we see all along the ancient shore lines of the Coast ranges and the Sierras, and about all other world mountains paralleling the shore lines. The occurrence of Styrax, Lyonothamnus, Erythea, and many other genera now widely scattered over the Earth indicate the extreme age of the flora of California and the continuance of a Tropical flora in California from the Tertiary to the present. In my opinion the flora of the islands is the product of ordinary transportation agencies, and nothing else.

In the mechanical makeup of the botany the book shows the lack of expert direction in spacing and typography. Names of Families should be in larger type than genera. It would be far better to separate families by wide spaces, and by heavy faced caps at least twice as large as those of genera. Doubtless the main cause was demand for less pages in a manual already too large, but a few pages more would not make enough difference to notice. I think the use of a secondary accent in long words is nonsensical, such as Selaginellaceae, particularly where it is not consistently used. Lycopodiaceae should have had the secondary accent on "po" but there is none. There is no reason why Selaginella struthioloides should have the secondary accent on the first "i." We are informed that Dr. Bradley is authority for the pronunciation of the Latin words. If so Dr. Bradley would have difficulty in getting classical authority for accenting the first "i."

On page 409 Jepson quotes Cleomella pubescens Nutt. There never was any such species. On the preceding page he gives Cleomella obtusifolia var. pubescens Jepson n. comb. when it should have been Nelson Biol. Soc. Wash. 18 172 1905.

On page 363 he puts the accent on the wrong syllable in Scopulophila.

On page 252 he keeps up the wholly untenable Agave consociata Trelease, which has no standing at all, being A. deserti.

On page 247 Jepson fails to give any accurate description of Yucca Mohavensis and Y. baccata. Whether Y. Mohavensis is really distinct from Y. macrocarpa is yet to be determined, but the real distinguishing characters are the following: Y. Mohavensis plants with a trunk often 10 feet high and a rosette of leaves at the ends. Leaves 2-3 feet long, very concave, coarsely fibrous-margined, apple-green. Flowers mostly globose or nearly so, 2-3 inches long, white. Pods fleshy, 3-4 inches long, oblong, generally constricted in the middle cross wise. Flowers very many

in an ovate panicle on a peduncle not as long as the leaves. Plants somewhat stoloniferous and in young plants leaves little raised above the ground. Yucca baccata is very much stoloniferous, often covering many square rods, and with the trunks rarely a foot long, mostly none at all, and with a rosette of coarse, bluish-white leaves 2 feet long and shaped about as in Mohavensis and with the same coarse threads on the margins. The flowers form a rather diffuse panicle composed of distinct racemes and mostly without peduncle. Flowers pear-shaped, bluish-white, mostly 3 inches long and conspicuously tapering at base, the outer segments with a bluish and wide stripe along the middle. Fruit pulpy and about 3-4 inches long, about as in Mohavensis but more inclined to be constricted in the middle; much infested by insects and seldom maturing. As a rule the flowers are rather scattered, rarely half as many as in Mohavensis. Mohavensis abounds from Bonelli's Ferry at the mouth of the Virgin river and up the Grand Wash to Pagumpa and westward to the Sierras in the middle of Owen's valley and southward to Lower California. Nowhere on the western slope except near the Palomar and San Diego. It goes a little farther down in the the Tropical life zone than Y. brevifolia but always grows with it. Yucca baccata does not reach the Sierras at any place. Its westermost locality seems to be the southern side of the Providence mountains, where it occurs along with Mohavensis and clearly hybridizes with it there. Then it extends eastward to the La Sal mountains. Utah, where it extends up into the Middle Temperate, thence southeastward to the Rio Grande valley and southward throughout Arizona and into Mexico. Mostly Tropical. Trelease in his work on Yucca p. 185 and following speaks of this species as abounding at "San Bernardina and southweard" where it does not exist. All his reference to this species is Yucca Mohavensis. Also his figure of Y. baccata is Y. Mohavensis. In the Texan-Arizona region Y. baccata has yet to be separated from arboescent forms referred to it hitherto.

It might be presumed that this rather extensive critique of Jepson's botany, and the multitude of trivial errors found in it would lead one to the opinion that the book is a failure. This sugestion I want to emphatically deny. Jepson's manual is the best thing ever gotten out on California botany except the monumental flora of California by Watson. The botany will be a hand-book for years to come, and deserves it. There are parts of the book that show too much haste, and other parts that follow certain botanists too closely but in the main the work is good.

Jepson's Manual. On page 432 Jepson states that Arabis platysperma grows in the San Gabriel and San Jacinto mountains. I seriously doubt this statement. So far as I can discover all the material in those regions is low altitude stuff that belongs with A. dispar.

It should be noted that the young pods of both Arabis pulchra and

glauco-valvula are white-pubescent and round, and become flat in age.

Jepson errs again on page 431 twice. He gives Arabis perennans as perannans; there is no such word. Then he fails to say that Pringle is the author and not Watson for the word. Jepson also misspells it on page 428. On page 430 Jepson puts two i-s on Arabis Lemmoni Watson where there is but one. If Jepson were to adopt the habit of putting two i-s on every personal name there might be some consistency in it, but he still spells Bolanderi, Fendleri, etc., in the old way. The old rule for the use of this letter was simpy one of euphony, but even this was not always followed by the best authors. There was no real reason for using two in many cases like Drummondii, Lyallii, Cusickii, Howellii, Parishii, etc., but I see no reason for doing else than to spell them as they were spelled in the first place. Numberless cases of errors of this kind occur in the book.

I like Jepson's way of using the grave accent for the long sound of vowels and the acute one for the short sound. This is an improvement on the Synoptical Flora of Robinson. Robinson errs on page 166 of the syn Fl. where he puts the accent of Lemmoni on the penult instead of the antepenult. It would be much better if the circumflex accent were used by Robinson for the long sound than to simply use the accent to show on what syllable the stress was put in pronouncing.

On page 423 Jepson capitalizes Brassica alba where he should not. He decapitalizes all personal names, following the foolish custom of the zoologist. In the main Jepson's idea of genera is sound. He seldom if ever goes off into the Brittonian vagaries.

On page 445 he misses the chief character of Draba corrugata which is the exserted stamens.

On page 446 he recognizes Greene's genus Athysanus, following Robinson in this, and then puts Draba unilateralis in it. But my species is truly a Draba. I incline to the opinion that Thysanocarpus pusillus is better put in Draba than anywhere else. This leaves Thysanocarpus free and does not hurt Draba any, for there are other Drabas that have pendent pods, such as nemoralis, etc. Robinson does not at all clarify the situation by recognizing Athysanus.

On page 178 of the Syn. Fl. I again take issue with Robinson, who puts the accent of Stanleya on the e instead of the first a. The y there is not a vowel but a consonant, if counted at all. Robinson also follows the old custom of pronouncing Stellaria Jamesii by accenting the e instead of the a. The e is a silent letter in the original and the name of the explorer always was pronounced Jams, the a being long. Therefore on the addition of th two i-s the accent should still be on the a. This is the same with the nameJonesii. Jones never was pronounced Jonees.

In his treatment of the Crassulaceae Jepson follows what to me is the foolish practise of Rose, but he strangely does not still follow him in

Cotyledon.

Jepson in the Cactaceae has the aid of Parish, the most experienced man in the Southern California flora, and his treatment of the family leaves little to be desired. I notice the omission of Mamillaria phellosperma from the desert flora, M. Grahami seeming to replace it, but this I very much doubt.

On pages 408 and 409 Jepson makes the new combination Cleomella obtusifolia var. pubescens, ignoring the fact that Nelson 20 years ago made the same combination in Biol. Soc. Wash. 18 172 1905. Jepson also states that his name is the same as C. pubescens Nutt. but so far I can find Nuttall never published a C. pubescens.

On page 450 Jepson creates the genus Congdonia whose type species is C. pinetora, which should be pinetorum. Jepson does not seem to know that pinetum is the latin name for wood, pine woods, and that the genitive pinetorum means "of pine woods," there being no such adjective as pinetora.

On the same page he gives Sedella pumilum instead of pumila.

Britton & Rose in Crassulacae page 67 state that Sedum Douglasii was published in Fl. Bor. Am. by Hooker in 1832. My information is that pp. 145 to the end came out in 1834.

Chaetocalyx Wheeleri Gray. For some unexplained reason Jepson frequently omits species from the California flora, and this is one. On general grounds it should have been in his manual because it was gathered near Klamath Lake. I also got it at Benton station, California, above Bishop, along the roadside.

By way of explanation of the fragmentary character of the comments on Jepson's Flora I will say that they were made at various times in the last five years as I came upon the defects in studying certain families, and there is some duplication thereby.

RYDBERG'S FLORA OF THE ROCKY MOUNTAINS

We are glad that at last Rydberg has put his conception of species and genera in book form. His sporadic publications hitherto have shown botanists that he has no conception either of species or genera. In addition he accommodates us by saying that any plant deserving of a name should have a specific name. What he really means is that if any fool botanist anywhere in the world has applied a name to a plant as variety form or subspecies that name should be raised at once to specific rank, and which he proceeds to do. He cares nothing about historic botany in which the masters in the past built up a system that was reasonably satisfactory to all. At the same time he quibbles over priority by position as though it was a matter of any importance. He "strains at a gnat and swallows a camel."

This book is what I have in the past dubbed bughole botany, species depending on the number of bug holes in the leaves. Rydberg has no conception that there is any such science as ecology, or that environment has any effect on species variation.

I have accidentally talked with several teachers of botany in various places, and find that uniformly they condemn Rydberg's Flora as unworkable. They find the same conditions predicted by me some years ago to prevail, that there is no end to this stupid way of doing things, and it gets one nowhere.

In the matter of names Rydberg is very sloppy, not hesitating to change names that never have been printed as he gives them. Such as Fremontii. Watsonii, nearly always putting two i-s where there never was but one, and yet all the time quibbling over trifles. Then his Latin at times is atrocious. For example, he makes my specimens of Draba glacialis from Alta, Utah, the type of his Draba uncinalis, evidently not knowing that there is any such Latin term. He must have intended to have the name apply to the dwarf habit of the plant, which is about an inch high, but uncinalis is not the term for that, uncinalis means belonging to a hook, if such a term ever was coined, which is doubtful. But uncialis is the proper term for inch-like. Then in quoting names his botanical inspiration slips a cog very often, in such cases as Draba ventosa Gray (Rydberg Fl. Ry. Mts. 351 and 354), where he calls it D. ventrosa. Draba ventosa means the Draba of the winds, ventus, ventosus, not ventrosus, of the belly, or anus. When people get their botanical inspirations from other sources than hard work, as the Brittonians always do, they should see that the Almighty who tends to the inspirational

business does not loaf on the job, or be so hopelessly lacking in ecological knowledge as he is. When we look at this last botanical abortion of Rydberg and compare it with his flora of Colorado, which covers the same field, we shudder at what the next edition will be like. But where one gets his species from his imagination instead of nature there is no other result possible.

An illustration of the lengths to which he goes in species manufacture is shown by his 50 species of Draba, where there may be 20 at the farthest. He also makes 50 species of Arabis, when it is doubtful if there are over 20 valid species. In his treatment of Parrya he shows no originality, nor any proper conception of the real characters of the genus. He still servilely follows Greene in keeping up Arabis graminea Greene, which is not an Arabis at all but a Braya, Braya granininea. Jepson shows much more care and study in his recent Flora of California, where he puts Gray's Draba eurycarpa in Parrya, where it would seem to belong. No field botanist can ever agree with either Greene or Rydberg in their treatment of species if he has any knowledge. For their treatment is simply whimsical. Rydberg does not yet seem to have discovered that there is a study called ecology. I am told that Rydberg's Flora of Colorado was a case of botanical pirating, he having published, under his own name, the MS. of another who had died or otherwise having been incapacitated. I hope this is not true, but there is a vast difference between the two publications accredited to Rydberg sufficient to account for dual authorship. Rydberg has several times been roasted for unethical acts in the past, and his neglect of acknowledgment of obligation to others, particularly older botanists, is conspicuous.

Taking up Thlaspi Rydberg shows his usual lack of morphological information in making his keys, which he founds in part on the shape of the pods at tip. The real shape of pods is determinable only in fully ripe fruit, and much fruit is not fully ripe, therefore the seeming acuteness of the pod is just a matter of immaturity. For example, he credits T. Californicum to Utah and Montana when there is no evidence that it is found outside of the Sierra region if there. Then he founds glaucum and purpurascens on the color of the sepals which amounts to nothing. Nuttallii and Coloradense are on as trivial grounds. Parviflorum is founded on the small petals, a common character in all Cruciferae, which is particularly evident in allied genera. I fail to see any character that will hold in any of the proposed species.

In revising Lepidium we find accentuating trivial forms which do not hold in the field. For example there is no character given by anyone that clearly distinguishes L. Virginicum, medium and Texanum, and ruderale. Robinson tries to keep up a distinction on the accumbent and incumbent cotyledons, petaled forms and incisions of leaves, but in practise we find a-petalous forms with accumbent octyledons, and with cotyledons oblique, and other forms having the general Virginicum character

and incumbent cotyledon Rydberg of course proposes new names for each of these forms so far as he has seen them, which is not far. Robinson particularly mentions the "flat" seeds of Virginicum, but there are just as flat seeds with incumbent cotyledons and apetalous flowers. The dissection of the leaves amounts to nothing. Southern forms almost always have more dissected leaves. An example of this is in the proposed L. Thurberi Wooton, which is a strict form of montanum with congested inflorescence, another common southern form, but the style at once gives Thurberi away as a derivative of montanum. Another case of abnormality is in L. Eastwoodae Wooton, which is a tall and straight alyssoides tending toward the annual forms (apetalum). To admit all the proposed species of recent authors is an admission that there are no characters worth while in the genus. On the other hand there are certain groups that are well marked. L. integrifolium nanum and Fremonti are clearly definable species, scopulorum and montanum are less so. Among the winter annuals, which include all the rest, there is hopeless crossing except in dictyotum. The apetalous form seems the most permanent. Lasiocarpum seems to hold fairly well in the hot region, but there is more or less hybridizing with apetalum.

Another instance of Rydberg's lack of precision is in his making the name L. Jonesii (Torr. Bull. 29 233) where he states that it is the same as my Lepidium montanum var. alyssoides (Zoe 4 266), "Not Gray." In the place where I created the new name var alyssoides I state that it is based on Gray's "Lepidium alyssoides Pl. Fend 10." I do not cite any type locality for my name. Then of course as I intended L. alyssoides Gray is a synonym of my var alyssoides. But Rydberg goes on to state that my type, which he assumes was collected at St. George, Utah (where it was not), is the basis of his L. Jonesii. His citation in the first place puts L. Jonesii as a synonym of L. alyssoides Gray as the first line of his name shows where he quotes my var. alyssooides as a synonym of his Jonesii. Though later on he quotes my specimen of L. alyssoides from St. George as the type of his Jonesii he cannot make two different things the type of anything, and so his Joensii passes into synonymy and he must perforce make a new name for the St. George specimen. Now all this fuss over the thing is made without his ever at the time having been on the field or knowing anything about the variations of L. montanum, and yet throughout his botanical inspiration he knows that my St. George specimen is a new species. Too bad the rest of us have to depend on reason for our work, when it would be so much easier to chip off a slice of botanical inspiration from his botanical god and get the truth without so much labor. There is nothing more certain than that Rydberg is always a blunderer, both in identification and bibliography, and cannot be trusted Then his handling of genera and species is diffuse to the utmost limit. In his work on Lepidium he follows Robinson's work, which is not satisfactory, as far as it goes, then he takes up Thellung's hair-splitting and

goes him one better. It so happens that most of the species treated by Rydberg are familiar to me in the field. To found species on the extent of pubescence, and the length of petals, shows a great lack of knowledge of the plants as they grow where the hairs vary from long and slim to short and stubby, which leads Robinson to use the term granular, an inappropriate one, for the short and stubby hairs. But Rydberg carries it farther. An examination of the species of Lepidium reveals great variance in the shape of pods of the same species. Then it is unfortunate that some other character was not used in describing pods as winged and in grouping them according to the extent of wings, which often separates related things. The result is that the species of Lepidium are still in a hopeless state of confusion. tI does not do for us to dismiss the question as Robinson does when he does not accept L. alyssoides as a var. of montanum by saying that though the species may intergrade at certain localities they are still distinct. Extreme forms can be separated but in the field it cannot be done. Alyssoides, in the form called Jonesii by Rydberg is shrubby as in L. Fremontii in the St. George region, but this character varies to simple biennial. The persistence of woody forms counts for nothing in the hot regions, where even tomatoes live from year to year and become bushes. All these things serve to emphasize the more the patent fact that closet botanists are not equipped to monograph genera. In my judgment these matters never will be settled till they are taken up by plant breeders. I consider Robinson's work in the Syn. Fl. as the best yet done by closet botanists, but there is still room *for* improvement.

It is impossible to follow Thellung in his treatment of Lepidium. He does not know the species he treats. He makes a new species of my L. pinnatifidum from San Diego and calls it L. Robbinsonii.

L. Virginicum varies from forms with large to minute petals or absent. The leaves seem mostly to be spinulose-toothed, all other characters fail. The pedicels are mostly long, 2-3 times the pods. I cannot make anything out of L. ramosum and ramossisimum Nelson. L. Vaseyanun and Crandalli seem to be scopulorum. L. crenatum is montanum. L. divergens is a form of apetalum.

Rydberg p. 19 Cont. N. Y. Bot. Gard 287 does not spell San Bernardino correctly nor Astragalus Bernardinus.

In commenting on my subdivisions of Astragalii Rydberg brings out what he considers inconsistencies, and they undoubtedly exist, but no one can treat any genus without being more or less inconsistent at times, for plants persist in growing in their own way. It is true that A. succumbens is not very near to the Malaci, and was long ago put by Gray and Watson in a separate group which they called the Succumbentes, but this arrangement does not solve any relationships. I for a long time kept up, even almost to the last, this grouping but in the end became convinced that genatic considerations made my last arrangement better, and I still

adhere to this view. But when Rydberg tries to split up the Hamosi he makes a mess of it. He makes the wholly unwarranted assumption that ĭ assumed Astragalus hamosus as the type of my group, which is not true. If he were consistent he would make a new genus of Astragalus calycosus, which to all intents and purposes is an Oxytropis. I have published a complete description of this very peculiar species.

It is rather amusing to find Rydberg putting A. ensiformis which I collected, and which no one else has ever seen, in his Tricarinatae. The question now is what will he do with A. cibarius, its nearest ally? These fleshy-podded species have no place there.

As was to be expected Rydberg still mare attenuates the A. Nuttalianus group, making fake species out of many forms, which are not worthy of extended consideration. But I am glad that he has at last got a chance to correct his own blunders and make more.

In No. 280 Rydberg has a chance to elucidate A. Mexicanus, but he adds nothing to show that this supposed species is a good one, and there is little evidence that it is any good.

In No. 280 Rydberg is very sure that I am wrong most of the time, which is refreshing, and that he who has spent little time on the genus is always right, which is also refreshing.

In No. 272 Rydberg reverts to Astragalus vespertinus, which is the form of A. amphixys most common in the Navajo Basin. I have collected this in all sorts of forms, and have many times been confused as to just where to put it, and a m still of the opinion that it may intergrade with some of the species with net-veined pods (pygmaeus). I have the advantage of him in having collected the specimens (all of them) on which he comments, and for that reason should know more about them than he can.

It is true that I made a number of blunders in identifying the species of this group, for the reason that at the time I did not suppose that Watson and Gray knew so little about them as I afterward found out. It was years before I was forced to abandon following Watson and Gray in their ideas of the genetic relationship of Astragali, and of the identity of several species, and nothing but extensive field work ever solved the problems for me, work which Rydberg never did and never will do.

No. 253 Rydberg tries to perpetuate the blunders of Pyper and others in the Gibbsi group. He also misspells Astragalus Alvordensis.

In the same number Rydberg tries to keep up the Kentrophyta segregates, which are impossible. Curiously he omits mention of A. humillimus altogether, which he would have to put here if he knew it.

Astragalus Robbinsii. Rydberg, Torreya Vol 24 p. 98 plus, does more hair splitting in regard to Astragalus Robbinsii. There is no one fact more patent than that species of plants in the far north often intergrade hopelessly, and this seems to be the case in this species. In the Gray Herbarium is a specimen of Michaux's A. secundus, which is the type of A. Labradoricus DC., in flower and with immature pods, and which is

with little doubt the same as A. Blakei, and of which A. Robbinsii is a variety. I find the same tendency to variation in the allied species A. andinus, elegans and aboriginum. Fernald is also another hair-splitter, whose distinctions become hopelessly attenuated. I have seen about all the material extant on this group and so far my conclusions are in my monograph page 133. I can find nothing to hang a valid species upon. Astragalus Nuttallianus DC. Rydberg has at last got his scissors on this hapless species, and the result is hopeless dismemberment. If he would take some kindergarten course in ecology, he at least would have a chance to learn that there is such a study, and that ecological conditions cause variations in the same species according to its susceptibility to change.

In the matter of specific distinctions I can see little difference between Rydberg and Fernald. Both are splitters from Splitville, though Rydberg glories in wallowing in the mire. While Fernald does not seem to know that he is in it.

FERNALD

Alnus Pringlei Fernald. Robinson in Proc. Am. Acad. 44 No. 21 page 612 gives a locality for this plant as collected by me at Terreria, Jalisco. I never collected any plant at Terreria, if there be such a place. The plant in question was collected at Ferreria in the Tapalpa mountains, east of the volcano of Colima.

Troximon Nutt. Fernald in Proc. Am. Acad. 72 p. 126 attempts to refute Hall in upholding Troximon instead of Agoseris Raf. I do not think that Fernald is very consistent in his stand in the matter, for it is perfectly certain that Troximon as a genus was properly published in Nuttall's Genera. It is true that the word Gaertn. was given as the author of the genus by Nuttall, but the mere name Gaertn. is the only evidence that he was the author of the name. That Troximon Nutt. not Gaertner has valid standing is evident, and should not be replaced by Agoseris as Hall contends. As to the prority of Krigia over Cynthia I am not discussing, and I do not know how it can be decided. But Troximon Nutt. must be based on T. glaucum, which was not included in Gaertner's genus.

Fernald. Cont. Gray Herbarium 76 p. 215. In closing his description of Astragalus, Fernald makes the following remark: "A. stragalus is closely related to A. Yukonis Jones,—a species of similar habit from the Yukon. Jones's description is very contradictory, he stating in the key that A. Yukonis has leaves sessile, very many. Leaflets 6-8 pairs, but in the detailed description, leaves all rather long-petioled." Leaflets 3-5 pairs." I am obliged for calling attention to the slip in the key, one of those exasperating blunders that we all make in spite of all our precautions. But why "very contradictory?" It is a common comment of

workers in the Gray Herbarium that Fernald is becoming a common scold. He needs to be taken out in the woodshed and given a spanking. It is to be hoped that this will be done before he gets to the Bronxian position of seeing nothing good in the works of outsiders. If he had ever given a tenth of the time to any genus that I gave to Astragalus he would have done much better work than he ever has done hitherto, and it is not becoming to make such stupid remarks, and does not enhance his reputation for fairness.

Harvard is not addicted to blundering, but Fernald seems an exception to the rule. In naming his proposed new species of Astragalus stragalus he makes two "very" serious blunders. The name stragalus should not be used because it does not correspond phonetically with the genus name, and because there is no such adjective as stragalus in Latin, a fact that Fernald ought to know. He might have used stragalarius, or stragalensis, but has little authority for using a noun as an adjective, and none in a way that means nothing. Fernald recently seems afflicted with that disease known as "caput intumescens," doubtless caused by too much gazing on the sun of his own personality till he has a case of snow-blindness. I fail to see where he has any justification for it for his work on Salvia and Antennaria he should be ashamed of, and his incapacity to discern specific limitations is notorious. Of late years he has shown one commendable virtue, refrained from monographing genera that he knows nothing about in the field. Astragalus stragalus looks to me like a cheap sophomoric attempt at alliteration. As to the validity of his species I make no comment except to say that it appears too near my species. For the leaves of my species vary so that the leaves are either sessile or long-petioled.

THE BRANDEGEES

Townshend Stith Brandegee. Class of 1870 Yale Scientific course, born in Berlin, Conn., Feb. 16, 1843. Son of Elishama Bandegee and Florence Stith Brandegee, who had 8 children, Charles, Florence S., Robert B., Emily, Katherine, Henry (died at Helena, Mont.), Arthur, Edward N. (Yale 1886). Elishama, who was born at Berlin, Conn., died there in 1884, and was a Doctor who graduated from Yale in 1833, and Yale Medical school in 1838. Florence Stith was born at Florence, Italy, whose father was consul at Tunis. She was a Bolling from Petersburg, Va.

T. S. Brandegee was a private in Co. G., 1st Conn. regiment, in the Rebellion. He entered Sheffield in Civil Eng. On May 29, 1889, he married Katherine Layne Curran, a graduate of the Medical Dept. of the California State University in 1878. She was a daughter of Marshall Bolling Layne. Brandegee was a civil engineer of the A. T. & S. F. R. R. with headquarters at Canon City, Colo. Also with the Denver & South-

Park R. R. He was assistant topographer and botanist for a year with the Hayden Survey. Was forest topographer in the survey of the Adirondacks, New York. Was forest topographer for the Northern Trancontinental Survey in Yakima Region, Wash. Was on the forest map of the Tetons Reservation, U. S. Geol. Surv. Was Surveyor of Canon county, Colo. Was city engineer of Canon City. Was a member of the Board of Education of San Diego, Cal. Was Hon. Curator of the herb. of the University of California. Was a member of the California Academy of Sciences, and San Diego Academy of Sciences. Was a corresponding member of the Phil. Acad. Sci. and New York Lyceum of Natural History. Was owner and editor of Zoe. Presented his herbarium to the University of California.

The two Brandegees, after living to a ripe old age, have also gone. Mrs. Brandegee, who was considerably the younger, died first in 1920. She was incontestibly the greatest woman botanist that ever lived. More of her later. Her husband, Thomas Stith Brandegee, first came to my notice in 1877 when I was studying Porter and Coulter's Botany of Colorado, where all through the book were constant references to his collections in Wet Mountain Valley, the Sangre de Christo range, Canon City, etc. He was a civil engineer in the employ of the Rio Grande R. R., with headquarters at Canon City. The next year I began my botanical work in the west at Colorado Springs, but I never met Brandegee for many years thereafter. He graduated from Yale in 1867 and was a classmate of my old friend, C. P. Brooks of Salt Lake City, who was the leading civil engineer of Salt Lake for many years.

Brandegee was a little, quiet, refined man, a great friend of the ladies, and a hard student, an old bachelor. In the early eighties he was attached to the transcontinental survey, following the line of the Great Northern R. R., and collected considerably in Washington. Then he seems to have made San Francisco his headquarters, where his botanical work brought him in touch with the California Academy of Science and the Californian botanists of note at that time, namely, Lemmon, Greene, Behr, Mrs. Curran and others. Mrs. Curran was formerly Kate Layne of Carson City, Nevada. The two seemed to naturally fit into each other's lives in a remarkable way and soon married. She was the most virile woman I ever knew and he was the most feminine man I ever knew. Her mentality was that of a man through and through, and she was intensely active and efficient. While all his tastes seemed more feminine. He was a college man and an engineer at a time when such men were at a premium in the building of the great highways across the country.

Brandegee began his work in Colorado just at the time of the close of Government exploration. In fact he was attached to two such parties, one in the San Juan of Colorado, and the other in Washington, north of the old route of Lewis and Clark. From his writings I learn that he was first with the Santa Fe R. R. Then with the Rio Grande R. R. He must have been employed during the railroad war between the two

roads, which in 1879 culminated in fortifying the Grand Canon of the Arkansas by armed parties from each road, in an e..ort to secure the only right of way through the canon. The Rio Grande R. R. had leased their road from Pueblo to Denver to the Santa Fe for a period of 99 years. In 1879 the Santa Fe began to convert to their own use all the rolling stock of the Rio Grande, and to paint out all indications of the original ownership. This led to a coup by my friend General Palmer, President of the Rio Grande, in the spring of 1879, by which in one night he stole back the entire road and equipment. The court litigation following this resulted in the Rio Grande getting back its road and the right to build the road through the Grand canon of the Arkansas and on up to Leadville, which at that time was the greatest mining camp in the world· The retirement of the Santa Fe from transcontinental rivalry with the Rio Grande and their building southward to Las Vegas and westward through northern Arizona, doubtless was the cause of Brandegee quitting Colorado.

My acquaintance with Brandegee's work began in 1877, when I began studying the flora of Colorado preparatory to exploring it in 1878. He always impressed me as being the best of field collectors, not old-maidish like Pringle, who never would collect a specimen unless it was in perfect condition. Wherever I have followed Brandegee I have found the new species picking very poor. He combed the country well wherever he collected. His memory was excellent and his ecological notes accurate. Pringle made the best of specimens ever made in the West, but he was too particular to be a good field collector. Brandegee was a very quiet man, and very hard to get acquainted with. A man of few words, who spoke right to the point always, and one who always avoided strife. After his marriage to Mrs. Kate Curran she became the spokesman of the family. Though she never dominated him. My more intimate connection with the two began soon after the launching of Zoe, when they solicited articles from me for publication. This botanical intimacy continued to the end. Mrs. Brandegee never attempted to dominate me in anything, was always considerate and appreciative, and when it became evident that they would have to discontinue Zoe she asked me to take it up and continue it, but I refused for lack of time.

Mrs. Brandegee spent several days with me in Salt Lake twice, going through my herbarium and consulting with me about Gilia, Eritrichium, and other genera in which she had done particular work. I remember with great pleasure the fine days we spent together. During her stay Mrs. Brooks, the wife of C. P. Brooks, who was a college classmate of Brandegee's, got up a reception for Mrs. Brandegee and invited the local celebrities to meet Mrs. Brandegee. I shall not soon forget the disgust she showed at being lionized, and her great relief when we were on our way home.

Mrs. Brandegee was a big and robust woman, a man in almost every respect, who was rather careless about her dress. Never put on any feminine finery, wore her hair tied loosely about her head, but was

always clean. She was all business and spent no time on formalities. She impressed me as every inch a queen. A person with a wonderful personality, and not at all social. She discussed contemporary botanists with perfect frankness, giving a just estimate of each, and she had a marvelous keenness of botanical discrimination, and a perfect memory. I never had the slightest fear that she would ever show anything but judicial judgment on any botanical proposition, or she would ever be anything but perfectly fair. Many times I urged her to write out in full an account of her botanical work before it was too late. Her reply was, "What does the world care for me?" Her death left her work in a chaotic condition. She of all others was the best equipped to write a real flora of California, and it was a calamity that she did not do it. The brochure of Setchell on the Brandegees gives in an impersonal way a review of their work, but I have felt that it needed the addition of a personal account which I have done so far as my acquaintance with them warranted.

Some eastern botanists got an idea that Mrs. Brandegee was a virago because of the way she handled Greene, but this was an erroneous idea. Greene was a man who never had any personal friends, his overweaning opinion of himself, which he was always injecting into his conversation. repelled people. He was a moral reprobate, a retired Episcopalian minister, kicked out of the pulpit because of sexual vices, and a conscienceless liar. The way Mrs. Brandegee handled Greene was perfect, and entirely free from any feminine bias. She knew him more intimately than others because she was a student under him at the beginning, and a coworker.

CRYPTANTHA BY PAYSON

This posthumous work by this talented young man appears to be the best ever done by him. Though I do not agree with him at all in his conception of species, believing him too much of a hair-splitter, I recognize his very conscientious work and the infinite pains he has used in getting results. When it comes to splitting genera we have two concepts—the Grayan and the Brittonian. The latter has always been discredited by its origin, which was institutional jealousy. However we find many botanists who wholly or in part have gone over to the European idea, which for descriptive purposes I prefer to call the Brittonian. Fernald does not differ in effect from Britton; he is just as much of a hair-splitter. Robinson in his treatment of Mexican plants does not seem to vary much either. To a collector in the field they are all tarred with the same stick. Rose has been for years in the Brittonian camp. The prevailing way at present is to make genera of any groups however small if those show no intregradation, but in effect this is not observed. To me the Grayan concept is far more scientific and desirable at least from the standpoint of ecology and genetics. I admit that there can be divergence

in perfectly honest investigators, and that every one has the right to respectful treatment so long as he does not assume as Rydberg always has, a sublime superiority due to "superior and most painstaking study," which to me is pure botanical bunk. Greene the boss bluffer is dead, Rafinesque also is dead, and the rest of the bluffers are rapidly sinking to their proper level.

We have certain generic concepts such as Aplopappus, Aster, Eritrichium, Astragalus, Carex, etc. Those less cemented such as Aplopappus, Eritrichium and Astragalus have been split ad infinitum, and what good has it done? I kept up Krynitzkia for the simple and only reason that Gray adopted it in place of Eritrichium on grounds of priority. Cryptantha I did not adopt for the reason that it was adopted by Greene, and I do not yet know which name should stand of all that have been proposed for the Grayan concept of Eritrichium, and further I do not intend to go into it till I get to it in regular course. I have long since lost my faith in the reliability at last resort of even Gray, to say nothing of the smaller fry. The older I get the less I think of genera founded on histology. There is no relief in sight till we can grow all plants.

I do not at this time intend to go into Payson's work on this genus. I spent a year on his Cruciferous segregates before I cared to state my opinion, and this genus I will study in due time, but my field knowledge, gained in 50 years of actual field work, leads me to discount at least half of his species. I do not see how any such list of species could have developed under the ecological conditions prevailing in the West since Tertiary times. I am inclined to think that a few species are in a state of flux, as is Astragalus lentiginosus, such as Eritrichium glomeratum and leucophaeum, and that they had far better be kept in a big specific group concept than to be split up.

Johnston. Proc. Am. Acad. 68 p. 46. In renaming Echinospermum subdecumbens Parry as Hackelia floribunda Johnston says: "The use of Parry's name in the Rocky Mountain Manual is incorrect. The plant is definitely blue-flowered, as the lack of mention of the color in Parry's observations would suggest." Now the type of Echinospermum subdecumbens was got by Parry on the slopes of the north bench south of Ensign peak, Salt Lake City, and every year I was over that very bench and for this reason I say without any hesitation that Johnston is wrong. The flowers range from sky-blue to pure white and every variation can be had at any time when the plant is in bloom. I have always thought it a well-marked variety of E. floribundum which is biennial and grows in the adjoining canon.

In his various studies of the Eritrichium group of borages Johnston seems to be gravitating back to the primary position of Gray, and also sliding back into the Brittonian camp of splitters. I hope that a field botanist can take his results and identify anything he finds thereby but I am much inclined to think that he will land at Patton, California as a ward. (Patton is where they keep all the nutty folks.)

TIDESTROM'S FLORA OF UTAH AND NEVADA

Tidestrom's Flora of Utah and Nevada. Some years ago this young man came out to Utah connected with the seed department of the Government, and was employed at the forest nursery in Big Cottonwood canon. When that was abandoned he left the state. He did a little botanizing in the Wasatch then. Later on he was in the La Sal region of the Navajo Basin, where he tried to make several species out of the grotto forms of Aquilegia. Recently he has worked a little in Western Nevada. This seems to be his equipment for writing a Flora of the great states of Utah and Nevada. During the several years he spent in Utah he never made any attempt to acquaint himself with my herbarium, nor did he ever call on me but once and that was when I was away in Montana. No one could ever write a Flora of Utah and Nevada without knowing the types in my herbarium. It seems to be a fad of the Government to send inexperienced young men out to write floras of western states, instead of employing men who know the flora already. Recently this was done by Standley, who was employed to write a Flora of Glacier National Park, when The University of Montana already had one in MS. form ready for the press.

One of the most noticeable things about this Flora is the looseness of locality citations. Everywhere we find references like this: "Covillea," Larrea, belt, "Artemisia" belt, which sometimes mean something and often do not. P. 80 he speaks of the aspen and spruce belts as though they were separate things, when they stand for the same thing. On page 73, in quoting Oryzopsis micrantaha, he says: "Plains and foothills, and canyons of the Covillea belt, Nebraska to Saskatchewan," etc. Rather unique that that belt should reach Nebraska and the Saskatchewan. In speaking of O. hymenoides range he says "Desert areas, plains, canyons and mountain sides of the Covillea belt, Manitoba to Texas," etc., which is not true, as there is no Covillea belt in Manitoba. He does not seem to know what the Artemisia belt is. It covers all of the Pinyon and decidious oak zones. Then in quoting the range of Oryzopsis Webberi he makes it Colorado to California when in fact it is confined to western Nevada and California and is a doubtful species at best. His work shows little discrimination as to the value of species, quoting almost everything that has ever been accredited to the region, whether it actually exists or not. A great deal of bunk is found in various publications which should be discriminated from the real thing. His synonymy unhesitatingly quotes species of mine, types of which he never saw and never made any attempt to see, as synonyms of other species.

Taking the Astragali, which I recently monographed, let us examine his ecology. A. ampllarius he gives as growing in "wet places, artemisia that it grows anywhere but on alkaline slopes where it is dry, and in the

belt." This plant he never saw nor has anyone else since it was collected by Mrs. Thompson near Kanab. There is no reason for thinking that it grows anywhere but on alkaline slopes where it is dry, and in the juniper belt. A. Wetherilli is given as growing on "plains and hillsides, artemisia belt." It has never been seen but once and that along the banks of the Grand river, east of Grand Junction, in the juniper belt. A. allochrous is given as "plains and hillsides of the Covillea belt, upward to the yellow pine belt." Its actual locus so far as I know is never in the covillea belt, and never up to the yellow pine belt. Then his range is far too great. A. Eastwoodae he gives as "Valleyes of the artemisia belt." It grows on sandstone ledges along the Grand river west of Grand Junction, near Moab, in the juniper belt. A. lutosus he also never saw the type. He says it grows in barren scoil of the artemisia belt. It grows only on sandstone ledges in western Colorado and not Utah. A. Tejonesis he gives as growing in southern Nevada, when it is not known to exist there. A. cermicus (pictus) he gives as growing on the plains and rocky canons of the artemisia belt. Its real habitat is drifting sand or sandy places. A. triquetrus he gives as growing in canons, when it grows on plains only. A. artipes he gives as growing in the yellow pine and aspen belt. Its real habitat is never in the aspen belt but in the juniper belt up to the edge of the oak belt. It should be noted here that the artemisia belt goes from the edge of the covillea to the aspen, two life zones, and includes the juniper and pinon belts as well. The juniper and pinion belts belong to my Lower Temperate and Merram's Upper Sonoran. The upper part of the artemisia belt belongs to Merriam's Transition, and to this belongs the yellow pine belt. A. Whitneyi he gives as from Nevada, but there is no evidence that it ever was found in Nevada. A. Wardi he gives as growing in the aspen and spruce belt, where it does not exist, as it grows in the oak and upper part of the juniper belt. A. Hornii he gives as growing in southern Utah, when it does not grow outside of California and Mexico. A. sesquiflorus he gives as canons and dry hillsides of the artemisia belt. It grows only on loose sandy ledges near Kanab, Utah, in the juniper belt. A. Thompsonae he gives as growing only in Utah on plains and hillsides, when it actually grows in Nevada, and Arizona, in sandy places in the Covillea and juniper belt, as well as southern Utah. A. Carolinianus he gives as doubtfully in Utah. It does not grow there at all. The only form known is the one he calls A. Mortoni. A. ursinus he gives as growing in valleys of the artemisia belt in Utah, when it actually grows only in Arizona, bordering the Grand Canon, in the Covillea belt. A. calycosus he gives as growing up to the spruce belt, Idaho and Utah to California, when it is common throughout western Colorado, New Mexico and northern Arizona. A. scaposus (a form of calycosus) he gives as growing in Wyoming to New Mexico, Arizona and Utah, when it does not grow in Wyoming, but occurs in south central Utah to northern Arizona and Nevada. A. atratus he gives as a synonym for A. pinonis Jones, which

it is not. A. stratrurensis he gives as plains and hillsides. It grows only in oak brush in canons. A. eremiticus he gives as a synonym of A. scaphoides Jones, when it is not. Scaphoides grows only in Idaho or eastern Oregon, and not Utah or Arizona. A. asclepiadoides he gives as growing on plains and foothills of the artemisia and pinion belts, when it grows only on alkaline areas in the juniper belt. A. sabulosus he gives as a synonym of A. procerus Gray, when it is not, and gives its range as the Covillea and artemisia belts of Utah and Arizona to California, when it grows only in Utah, near Moab. The A. procerus of Gray is a form of A. Pattersoni and grows so fas as now known only in the vicinity of St. George and Zion canon, Utah. A. Preussii he makes as a synonym of A. Mokiacensis, which is not. A. remulcus he gives as of the yellow pine belt in Arizona, when it belongs in the juniper belt. A. Zionis Jones he gives as of the artemisia and pinion belts of Utah, when it is found only on ledges of Zion canon. A. cymboides Jones he gives of the plains and hillsides of the artemisia and pinion belts, Utah. It grows only on plains in the juniper belt. A. peterocarpus he gives as alkaline plains and hillsides, when it is found only on the alkaline flat of the Humboldt river. A. Purshii var. tinctus he gives as a possible synonym for A. funereus, which it is not. A. debilis he gives as ranging to the Yukon. which it does not. He keeps up the fictitious A. Garrettii (of Rydberg), which is only a form of A. tenellus. He also blunders in making A. Kaibensis the same as A. lancerarius. This is partly my fault, as at the time of publication I mistook A. lancearius for another species, but later on I had a chance to study the plant growing abnudantly. He gives A. flexuosus as growing in Utah, when it does not. He fails to see the spurious character of Sheldon's A. curvicarpus, which is only a form of A. Gibbssii. He gives A. speirocarpus as of sagebrush plains and dry hillsides, when it grows on sand dunes only. He keeps up such fictitious species as A. tegetarius, which is only a form of A. montanus. He omits a number of species such as A. Oreganus, A. terminalis, Mohavensis acutirostris, etc. His whole work shows little real study of a critical kind, and very little knowledge of localities or life zones.

Taking the Cactaceae we find him adopting the recent work of Rose & Britton, which nobody adopts. The same loose citations of localities are found here as elsewhere. Echinocactus polyancistrus is given as of the artemisia and covillea belts, Nevada and California, which is utterly vague. The fact is that the species grows only in the covillea area of southwestern Nevada, south of Goldfield, and in the Death Valley region of California. He does not mention E. polycephalus at all, though it is common. He gives Echinocactus Johnsoni Parry as Johnsonii, but has not the slightest idea of where and how it grows. He says "desert areas, canons, and dry hillsides of the Covillea and artemisia belts, southern Utah and Arizona." Now desert areas is all right for the whole region of the west is desert, canons is all right, for the region in the mountains is mostly canons and ridges; dry hillsides is all right, for all the hillsides are dry. But what does it all mean to a botanist Nothing worth

while. Now where does this very rare plant really grow? The type locality is on the western slopes of the Beaverdam mountains, Arizona, in the Larrea (Covillea) belt, sloping mesas. It does not grow so far as we know in Utah. Near Moapa, Nevada, it grows on the slopes of gulches in the juniper belt at about 6,000 feet altitude in the mountains. At Searchlight, Nevada, it grows on the slopes of dry hills in the Larrea belt. It has never been seen anywhere else except a questionable specimen by Coville in the Death Valley region. Echinocactus Sileri he follows Rose in crediting it to Utah, and Rose knows nothing about it except the brief note of Engelmann in the original description, who credits it to Pipe Spring, Arizona (not Utah), and on Cottonwood creek, near there. There is no evidence that the plant grows in Utah. He credits it to the artemisia belt, when it is in the covillea belt. Echinocatus Simpsoñi he also gives two i's, as usual. His localities for this are plains and hillsides in the artemisia belts. There is no evidence that it ever grows on plains. Its chief localities are rocky ridges of the oak zones and lower spruce zones, though at Colton, Utah, it grows just on the lower edge of the oak zone. He does not give Mammillaria deserti at all. He gives Opuntia pulchella as desert areas and hillsides of the artemisia belt. So far as I have seen it grows on flats in the atriplex areas of western Nevada only. He does not give O. rutila at all, nor mesacantha, nor arborescenes, and he gives no symphony. He does not give the mountain Mammillarias at all. His distribution knowledge is about nil except what he can get from others. This is a sample of the whole work, and the Government is paying for this kind of stuff. Why not send these young men out to dig potatoes? They could only hurt the potatoes.

In his account of Lepidium scopulorum Jones his localities are "Valleys and canyons, and mountainsides, which shows that he knows nothing about its habitat, for it grows only on cli...s, never in valleys. He shows the same ignorance in Lepidium integrifolium, where he says "valleys and foothills of the artemisia and Pinon belts," when in fact the plant grows only on alkaline flats along with Sarcobatus and the like.

Another illustration of Tidestrom's foolish way of citing localities is Iva Nevadensis Jones. He gives it as "Artemisia ,belt" Nevada. Now since all of Nevada except the southern part is artenisia belt, this has no significance except to exclude it from Utah. Now the facts are that up to the time of the publication of his flora nobody ever saw it but myself, the original collector and I found it in the park at Hawthorne and the type locality seems to have been obliterated. Now Hawthorne is on the very lower edge of the sagebrush adjoining the Tropical. Since then I have found it in two localities, in identical zonal localities, one at Benton Station in the upper edge of Owen's valley and the other west of Columbus Marsh, near the pass leading over from Tonopah to Bishop, and both in California. From Tiedstrom's locality no one would know whether the plant grew at Ely, Searchlight, or Reno. Tidestrom does not know enough about ecology to know that the artemisia belt goes through two life zones from the Larrea (Covillea) to the spruce (Canadian), and

includes the pinon, which he seems to think is distinct from the artemisia. In citing range of Iva axillaris he says "artemisia, pinyon and yellow pine belts. Now the artemisia covers all of them, the yellow pine belt being Merriam's Transition. But Iva axillaris goes down into the Tropical also.

Now take some Gilia localities. Gilia McVickerae is given from the artimisia and pinyon belts, Utah. The facts are that it has never been found outside of the type locality at Marysvale, Utah, on arid and clayey south slopes of volcanic cliffs, Lower Temperate life zone. Gilia scopulorum Jones is given as from rocky places of the Covillea belt of southern Utah and Nevada. Its real locality is St. George, Utah, growing at the base of lava flows in the shade. Gilia ochroleuca Jones is given as plains and hillsides of the Coviliea belt. The facts are that it grows in loose sand in the Tropical from the Colorado river westward. He gives Gilia Watsoni as rocky hillsides and dry canons, when it always grows on cliffs, and extends to California. He says of Gilia Nuttalli that it grows in canyons, rocky slopes and ridges of the artemisia belt. In fact the plant is always found in coniferous forests of the Middle and Upper Temperate in dry places, preferably ridges. Its southernmost limit being the Charleston mountains, Nevada.

In his treatment of Dicoria Blake, who does this family for Tidestrom, goes too far in emphasizing the development of the bladdery covering of the seeds, whose development is simply a factor of humidity at the time of fruiting. Blake's treatment of the Aplopappus group seems sane, though he recognizes altogether too many species.

Taking up Astragalus Tidestrom has made a complete mess of it and keeps up most of the forms described as species by anyone. Of these I will not speak now. On page 324 he puts the question mark before A. Peabodianus instead of after it. He makes A. eremicus Sheldon a synonym of Fremonti, which it is not. He makes A. latus Jones the same as araneosus Sheldon, but that species is a form of palans. He makes A. pinonis Jones a form of atratus, but it has no relation to that species. He makes A. eremiticus the same as my arrectus var. scaphoides, which it is not. He makes A. sabulosus the same as A. procerus Gray, but that is a variety of Pattersoni, while sabulosus is a good species of the Preussii group. keeps up my A. Uintensis, when it is the same as A. argophyllus. He makes my A. funereus the same as A. Purshii var, tinctus, a most egregious blunder, for it is closely related to A. coccineus. He makes A. episcopus the same as A. lancearius and Kaibensis, when in fact none of the species are synonymous. He makes A. Coltoni and its var. Moabensis the same, when they are quite different. He could have avoided all these blunders by reference to my monograph, which was available to him at the time.

GREENE

There have been several notable deaths in the botanical world since my last Contributions. Greene, the pest of systematic botany, has gone and relieved us from his botanical drivel. They say that the good that men do lives after them, but the evil is interred with their bones. I suspect that his grave must have been a big one to hold it all.

An illustration of the dishonesty of E. L. Greene is shown in his description of his new genus Disaccanthus on page 224 of Leaflets, published in 1906, where he publishes Disaccanthus validus, based on my Streptanthus platycarps, collected in 1884. He first stated that it "was collected somewhere in western Texas" by me, when the label on the only specimen he ever saw stated that it was got at El Paso. Then he knew when he published his new name that the specimen was in fruit with a few flowers, and so how did he know that it was not what I had called ? Greene was first, last and all the time a botanical crook, and an unmitigated liar, when it suited him to try to make a point against someone else. He describes the pods as 4 lines wide and obtuse, when they are 5mm. wide and very acute. The flowers are creamy-white, or purple, and with conspicuously oblanceolate petals. Then he describes the plants as stout, when they are slender. The root leaves are pinnately divided. The flowers are inflated below and not in the middle. The material on which he based his species was the only material that I ever distributed as Streptanthus playcarpus, and the name should be S. carinatus. He also makes another name D. Mogollonicus out of stuff of his own collecting, which seems to be the same, as is also his D. luteus. One can have patience with a fool but not with a crook. S. carinatus is described as having purple flowers. All my material from that region has purple or white flowers or cream-colored, the petals sometimes being purple, but there seems to be no other character, while we know the flowers of all the species vary from white to purple, but the angled and carinate calyx is characteristic.

I got my material which Greene saw and used as his type in April, 1884, at El Paso, Texas, as is distinctly stated on the label. The actual place of collection was just north of the city on the hills. My material fits Gray's description in the place where the type was described (Pl. Wright. 210) as to the color and shape of the flowers, and which Greene tries to distort by the implication that the flowers of the type were not purple, when they are so described. One thing Greene did not observe was that the young flowers are not at all keeled, but the mature ones are decidedly so. He evidently got his names mixed, as S. carinatus, which is also described in the same place, is given as having purple flowers. My old material of this species, which I gathered at Rincon, New Mexico, April 30, 1884, and which I had also called S. platycarpus, has the characteristic flowers keeled conspicuously, but yellow. My observation

of the flowers of this genus indicate that though they are normally purple they sometimes are green or white, which I often find in S. cordatus. White or cream color seems th more prevalent color of the hot deserts.

Another evidence of Greene's lack of precision is shown in his characterization of Arabis nardina (Leafl. 2 70), where he says: "The second species here presented, though the specimens are past flowering, is readily seen to be of that well marked broad-petaled group which A. pulchra of Jones is typical." Then lower down he says: "The label once bore the name, in Sereno Watson's handwriting, of Arabis platysperma, but the specific name was erased, evidently by Mr. Watson himself, and no other written in place of it. The plant is certainly far removed from the group of A. platysperma; and no one familiar with A. pulchra and with the diverse aspect of things made congeneric with it, could fail to see that, despite its erect pods, this is of that group." This flambuoyant buncomb was calculated to impress the ignorant with his superior knowledge and insight. Now what are the facts? I am the author of the name pulchra and have in my herbarium more specimens of it and its congeners than anyone else. It is closest related to A. arcuata, and only remotely related to the platysperma group. It is destitute of the conspicuous style and acuminate pod of that group, which is a conspicuous character in nardina and its mother species, A. Parishii, of which it is a well marked variety. It also has the peculiar character of wavy sutures which distinguishes platyperma from all others. That platysperma, petiolaris, Parishii, and suffrutescens are in a group by themselves is evident. To this also belongs A. Howellii. Greene then goes on to make a spurious connection between A. pulchra and the Breweri type, in the same hot air way. If this were the only break of this kind we might forget it, but it was Greene's constant device to reinforce a weak position, and he did not disdain to knock anyone who was in the way at the time, as in the case of Arabis gracilenta Greene, where he discredits Heller, who collected the type of gracilenta, and stated that it was A. Fendleri from the type locality. Greene does it in this way, Pitt. 4 194: Nevertheless nothing like the Fendlerian plant on which A. Fendleri should be based is in Mr. Heller's collection." Which is more buncomb.

Greene's assurance was limited only by his opportunities, and his assumed superiority in first hand knowledge was sublime to those of us who knew he did not know straight up about what he was writing about In fact it never had its equal except in some of the writings of Rafinesque and recent pronouncements of Rydberg on Astragalus.

Sibara Greene Pitt. 3 10. I incline to think that Greene is right in erecting this genus to include certain Cardamine species. I never could feel like putting them in Cardamine. C. Palmeri is far better a Thelypodium than a Cardamine, suggesting a relationship with the deflexum group of Sisymbrium.

Ranunculus Populago Greene Erythea 3 19 1895 is another case of sharp practise on the part of Greene. I had that sheet out and under study and named Ranunculus Cusickii in the winter of 1894-5. Greene comes along and finds out what I had done, and gets his name in print

before I did mine. This to him was a piece of cute work, like the Mexicans do when they cheat you out of a few cents when you make a bargain with them. He had once before got me to send him a lot of material of Compositae from my collections, on the plea that he was going to monograph the family. I went to the trouble to give him a complete suite of Compositae. After receiving them he replied that my stuff was so poor that it was fit only for firewood and so he refused to send me specimens in return for them except a few things from New Mexico. Later on, when he began to publish comments on the Compositae, he spoke of my specimens as a part of his set of my Colorado plants, when the fact was that he never bought a set of my plants in his life and never before or since got any from me. Greene was first, last and all the time a cur.

In Pittonia 3 127 to 138, Greene, with a great show of erudition, regroups the species of Erysimum into Schoenocrambe, Cheiranthus, and Erysimum, putting E. asperum and E. cheiranthoides in Cheiranthus, which is about the most stupid thing a real botanist would ever do There might be some reason for keeping up Cheiranthus for a certain group, but to put E. cheiranthoides into the same shows a total lack of discrimination. There is a certain resemblance between cheiranthoides and Sisymbrium species, like virgatum, but to keep the former in Cheiranthus spoils it all.

We have a similar problem in Sisymbrium. I don't see how S. canescsns and altissimum and deflexum can be kept together, but to run certain Thelypodia into the genus makes a mess of it.

Recently I have been going over Greene's Leaflets and notice his treatment of Rhus trilobata, which makes one feel like committing murder, but fortunately Greene has passed beyond human retaliation. His case makes one half inclined to believe in Hell, for no other place would be suitable for him.

Hesperodoria scopulorum (Jones) Greene Leaflets 173. Bigelovia Menziesii var. scopulorum Jones Cont. 7 692. Greene says of this, "where it is described by Mr. Jones, who however failed to apprehend its real affinities. It is next akin to my genus Pteradoria, i. e. Nuttall's Solidago pumila," etc., etc. It is wonderful how Greene, with but a single specimen to study, in contrast with the collector who saw it growing and got much of it as it grew, and who studied it on the field and was such a numbskull, while Greene, with his marvelous conceit, could see characters that never existed at all. Then again, what did Greene ever know about the real relationship of Solidago pumila as to whether it is a Bigleovia or a Gutierrezia? The only thing I regret is that I did not get after him years before I did, and show him up as he deserved. Had I seen all these remarks when they came out I certainly would have roasted him to the queen's taste. But I never examined much of his work till it came up in order after he had gone. And in addition I had so little confidence in his work that Idid not think it worth considering.

Corrections of the Synoptical Flora edited by Gray, Watson and Robinson.

Page 107, line 4, insert "leaves" between "and" "obovate."

Page 107, second line following Draba Mogollonica, read "stellate-pubescent."
elsewhere.

Page 122, Lyrocarpa. For complete description of living plants see

Page 127, line preceding "L Menziesii," exchange "exceeding" for word there.

Page 127, insert just before the line "L. apetalum," etc., the line beginning with two equality signs and the word "apetalous" to correspond with "Petals present" above.

Page 148, substitute "N. curvisiliqum" for "curvisiliqua."

Page 148, third line below "N. obtusum," insert "pods" before "1 to 2 lines long."

Page 160, under "A Nuttallii," third line below, write "entire or obscurely denate."

Page 163, under A. alpina, the fifth line below, insert "pods" before "glabrous."

Page 163, under Turritis, one star has "Radical leaves dentate," on the next page and under this head A. Holboellii is described as having entire leaves.

Page 165, the first line should give credit to Pringle for the name, if we were to use the common but not Grayan method. This has led Jepson to err on page 431 of his Manual, as indicated elsewhere.

Page 167, fifth line below "A. pulchra," change "three fourths" to "three to four." This is a straight blunder of Robinson's.

Page 172, under Caulanthus glaucus, the petals should be given as dirty white.

Page 178, "Stanleya" should have the accent on the first "a."

Page 179, the doubtful specimen referred to is surely S. elata. This is on the first line of the page.

These suggestions are submitted not as criticisms but as corrections of this admirable work.

Watson Cont. Am. Bot. (6 p. 63) refers a flowering specimen of "M. E. Jones at San Quentin." Lower Calif. to Coldenia angelica. M. E. Jones had never been at San Quentin up to that time, nor any other for 30 years after.

CRASSULACEAE BRITTON AND ROSE

This attempt to monograph the genera of this family shows haste and lack of thoroughness. I find synonymy is incomplete. Sedum subalpinum Blankenship is not mentioned, as is also Sedum Elrodi Jones, both species being published some years before the revision was contemplated or written.

The same method, fathered by Britton, of splitting up genera on trivial grounds, that was so conspicuous in the Cactacae, is used here, much to the detriment of systematic botany. The same method of making species of mere forms is also characteristic. The experience of Rydberg in his Flora of the Rocky Mountains ought to have been enough to deter them, but it was not. The condemnation of Rydberg's flora is almost universal. It cannot be used successfully in the class room.

BRITTON AND ROSE'S CACTACEAE

This sumptuous series of volumes would have been a great addition to the knowledge of this intricate family had the time and money been spent by men interested in real botanical research instead of botanical propaganda, but nothing having the imprint of Britton can have much scientific worth because he injects his personality everywhere and all the time to the detriment of research. He outgreenes Green, and Greene was insane. The most objectionable thing about the Cactaceae is the wholesale creation of new generic names for various groups within older genera, new names based on trivial characters. Had these names been the result of new studies and discoveries in morphology, or plant growth, there might have been some excuse for it, but there has been practically no such work, it is simply a rehash of old material, after the fashion of Greene and Rydberg.

Coulter and Rose in Cont. N. Herb. 12 441 following, take up recent Umbelliferae and make certain comments. In reference to my strictures on their work they dodge the whole matter by declining to take up my criticisms, or reply to them, hiding behind the following buncombe: "This wholesale merging of distinct groups of species is based on a conception with which we cannot sympathize," etc. It has been evident for years Rose has lost all conception of genus or species, and for that reason cannot sympathize with those who attack his failures, but this dodging will not help him or prevent an examination of the grounds for his creating new genera. There are certain ecological facts that cannot be escaped, and the field botanists will force this recognition from the closest botanists whether they want it or not. We are tired of this assumed superiority, which is pure blu.... It is too bad that my estimable friend has passed on and cannot answer. In my strictures on his work I found fault with the generic character of his proposed new

genera and showed just where they fell down, and it was up to him to show where I was mistaken, which of course he could not do. I have had the advantage of Rose and Coulter in having spent the greater part of my life in the region where these genera grow, and had studied the plants growing and knew of their intergradations. It might do with eastern botanists to swell up and assume superior knowledge, but we western men, who really know the plants as they grow, cannot be bunkoed by this kind of bluff.

J N. Rose. The announcement of the death of Rose comes as a shock to his old friends. As a man and citizen Rose was a prince. No one could know him without liking him. When I went to Washington the first time in 1894 he at once took me under his care and piloted me around to the various workers and introduced me to them all, Dewey, Pollock, Merriam, Palmer, Miss Vasey, Mrs. Baldwin, Miss Clark, and many others. Then over to the Botanical Seminar where I met Irwin F. Smith, and others in his department. Then over to the Corcoran Art Gallery, and to the Presbyterian church of which he was a member. Then to tea at his house, where I met his family. He was always a helpful botanist, ready to assist in naming anything, a self-abnegating man. His chief defect was lack of assertiveness, willingness to be dominated by those above him, just so long as he could work. Naturally his ideas of specific and generic di...erences was good, but in trying to keep up with progress he followed the bell wethers too closely for his own good, till at last he lost all sense of botanical fixity in either genera or species, and his work on Cactacaeae was a riot. Naturally he was a conservative, much as his later work would seem to disprove this. No work that he ever did was equal to that on the Umbelliferae, and this was his first work of any importance. He was slated for the position of botanist of the Department of Agriculture, and was next in order after the death of Dr. Vasey, but he was ruthlessly pushed aside by Coville, just as was Dewey by the scoundrel F. Lamson Scribner, from being head of the work on grasses. That Rose should have remained in the Department of Agriculture and Smithsonian Institute as long as he did is a marvel, for those two institutitnos are the Kilkenny cats of the Government, where each man is clawing all his neighbors in the mad scramble to get to the top. When I was temporarily connected with the Department of Agriculture in 1894 one of the men came to me and said one day, "If you don't quit working so hard you will lose your job." I replied that that was impossible for I was employed on an explicit understanding that my job was to end in a year. Further I asked why hard work on my part would produce antagonism. He said, "You discredit the rest of us." I had seen that laziness was a prime requisite in the department.

NELSON'S FLORA OF THE ROCKY MOUNTAINS

Since my last Contributions several floras have come out, Nelson's being the first. This is supposed to be a revision of Coulter's flora, published many years ago, which was the outgrowth of his and Porter's flora of Colorado. Coulter's Flora was simply a compilation, as was his Flora of Colorado. It contained no critical study but was valuable because it gave the locus of publication of various species of the many U. S. R. R. Surveys. Species of Watson, Gray, Torrey, and Engelmann. Then Nelson comes along and with much bluster about the "Rocky Mountain Herbarium," a small collection of Wyoming plants made mostly by himself, he attempts to get out a real Flora. The one glaring defect of Nelson is his perpetual blundering, and lack of ecological knowledge. He poses as a conservative, not a splitter like Rydberg and Greene, but in his own species he is as bad as any of them. Then a very reprehensible thing is his flatulent praise of the men he is afraid to antagonize, and the total lack of any real appreciation of brother botanists. For example he slops over in acknowledgment of obligations to those two men when he does not even mention the one man to whom he was the most obligated for information and botanical material got in exchange through years of correspondence. Possibly there was method in his neglect, for that man was also preparing a similar flora and had been at it many years before Nelson was known in the West at all. Another feature of his work is the many omissions of well known species. At least 50 that grow in the region that Nelson knew nothing about. Hitherto I have refrained from criticism of his work for personal reasons, but of late there has come from the University of Wyoming continued disparaging remarks from his protegees, until forbearance has ceased to be a virtue. For example MacBride, a protegee of Nelson, attempted to do a little work on the borages, and in that work criticised my use of the name Krynitzkia instead of Cryptantha in making certain new names for borages. It ought to be perfectly plain to a novice that I do not use nor intend to use any of the new generic names till I know w hether they are worth recognition, which requires intensive studies which I do not intend to take up except in order. I prefer not to slop over like the Wyoming folks do, and I do not intend to ask anybody's permission when I do it. Nelson, with his poor equipment in material and experience, might attempt it, but I won't do it. Real botanical work is not favored by petty jealousies. I have no sympathy with the Brittonian method of finding fault with coworkers in any field. It gets no one anywhere. There is no field anywhere for such men, but small fry are always trying it. So far as Nelson's work is concerned he will in due time reach his proper level without my assistance. In fact has already done so. But his botanical kids will still think they are grownups.

Coulter published what he called the flora of the Rocky Mountains. He did not know much about the ecological limits of the region. His was in fact a flora of Colorado with northwestern extnesion, exclusive of southwestern Colorado, about which he knew nothing. Nelson followed him in this interpretation. Ecologically the Rocky Mountains flora extends to and not through the Clover mountains of Nevada, thence southeastward through Utah to the Grand Canon in the mountains and northeastward to the base of the Uinta mountains along the plateaus, and thence southeastward through Colorado to central New Mexico. Rydberg in his last emission covers this area and more. The main aim of both men seems to be to skim the cream of the prospective buyers of botanical books, rather than to follow any ecological lines.

It would consume entirely too much valuable time to go over Nelson's book in full, so I will take up a family to show how his treatment works out. The Cruciferae. Stanleya pinnata he splits into three spurious species. He keeps up the Greeneian bunk of Schoenocrambe which is an Erysimum. He does not know the di...erence between Thelypodium and Streptanthus, the last two of his species of Streptanthus are Thelypodia. He recognizes twice as many species of Lepidium as exist. He does not even seem to know of the existence of my L. scopulorum, one of the very few valid species. Thalspi alpestre he splits into four species. He does the same with Cardamine cordifolia and Physaria. He follows Greene and Rydberg in splitting Capsella in two, not knowing that Hutchinsia procumbens often shows the real Capsella pods as sports of the usual form. In Camelina he does not know of the existence of C. microcarpa. In Draba he trots along behind Greene. He makes a blunder in quoting Greene's D. Mogollonica by calling it mongollonica. On page 223 he quotes Greene's Draba graminea as a possible synonym of D. chrysantha, when in fact it is not a Draba at all, but a Braya. He goes o... on the first year blooming perennials as though they were annuals, as do both Greene and Rydberg. In Sophia he also follows Greene in splitting. In Arabis he gets tangled up in the botanical woods. He puts Greene's A. formosa far away from A. Selbyi Rydberg and does not even mention my A. pulchra of which these are synonyms. Nor does he ever seem to have observed the peculiar pod character of this species. He keeps up the old distinctions on which Gray based Erysimum, when any tyro should see that E. cheiranthoides and asperum cannot be congeneric. On page 228, in describing A. aprica, he says the stems are 1.5-2 cm. long instead of dm. long. He does not even mention Parrya macrocarpa, which is common in the Uinta mountains. This lack of exact knowledge is characteristic of the entire book, and vitiates its worth decidedly.

LIFE ZONES

Soon after my arrival in California to stay, in 1923, when I had gotten a clean-cut idea of the ecological conditions in southern California, and of the views of Clements, Hall, Grinnell, and others as to life zones, it became evident that either they or myself were radically at fault in their conception of life zones. I have discussed at length the subject of life zones in Contributions No. 13, and my reasons for rejecting Merriam's terminology. There is no living botanist who has covered as much of the ground in dispute as I, and for this reason I am prepared to defend my position. The various belts of Hall as given in his discussion of the botany of the San Jacinto Mountains are drainage areas for the most part, good for local consumption but worthless for wider use, and of little zonal significance. As I have stated elsewhere temperature must govern the limitations of life zones, though humidity is the chief factor limiting plant formations. In selection of zonal guides (certain species of plants) we have to take into consideration the actual reactions of those guides to all ecological factors, in order to weigh the evidence they give of the life zones in which they are found so that we can evaluate the evidence they give. For example, the aspen is a very valuable guide to the Upper Temperate life zone in the arid west (Wyoming to Texas and west to California, Sierra regions) but worthless wherever the humidity is high, such as in western Montana and westward. Pinus ponderosa is a good representative of the Middle Temperate life zone in the same region except in the southern Sierras and in Montana. Juniperus Utahensis is a fine representative of the Lower Temperate life zone throughout except in southern California, where its variety Californica, if it be a variety, goes far down into the Tropical. Larrea Mexicana is the best zonal guide we have for the Tropical, and never fails to tell correctly the life zone in which it grows. But the Larrea does not grow on the western slope of the Sierras nor on the plains (coastal) because of the high humidity, but its place is taken by Adenostoma fasciculatum. An acceptance of these facts will lead to the unraveling of the apparently inextricable tangle in which the botanists and zoologists of California are engulfed. At a later date I may take up in detail the various areas affected but this is not my object here. As is well known Merriam placed the whole Larrea belt in the Temperate life zone, calling it Lower Sonoran, a misnomer, for it is largely crowded out in Sonora by Leguminosae. But wherever local conditions permit the Larrea grows as far south as central Mexico, and always in the Tropical life zone. If the California botanists were to extend the locally Californian terminology of "Subtropical" it would include the entire area where the Larra grows. But this would completely disrupt their life zones. For at the south the Larrea grows side by side with the Papaya, persimmon, sugar cane, date, and other

truly Tropical plants. So they must either discard this plant as a zonal guide, and do this arbitrarily, and without ecological reason, or change their conception of life zones as I have done, which is the better way. Now the practical man will ask, "What is the use in scrapping over these things?" Well, the reason is that it is of fundamental importance to know what life zone you are in if you are to try to breed plants. Millions could have been saved had people known what I know now about life zones. But they went ahead and tried to grow plants that were not adapted to and could not endure the conditions. In addition their theories led them to suppose that certain desirable plants, such as dates, could not be grown in certain areas because of extreme aridity, when a very meager idea of zonal conditions would have told them that dates can be grown wherever the giant cactus grows, or the ochotilla. This also applies to the fig, sweet potato and the palms. Brandegee in discussing the distribution of the flora of Lower California tries to separate the truly Tropical from other zones by geographical limitations, and the attempt falls flat. Goldman also does the same in discussing the areas of the Cape region. The attempt to keep up spurious limitations of Merriam leads him into all sorts of confusion. If there were any particular significance in the limitations proposed by Goldman and Brandegee the same things would be observed on the mainland eastward on the other side of the gulf, but they do not exist there. There is no place from Nogales southward where you can put your finger and say "Here is one zone and there is another" and reinforce the statement by citing the plants growing in those areas. The giant cactuses Ceresus titan., C. calvus, C. Pringlei grow indifferently throughout the region from the Cape region to Guaymas, and though there is a marked difference in the flora the feathering out is so gradual that no limitations can be found. The peculiar flora of central Lower California is due to the isolation in recent geological times rather than to any zonal causes. And the strange forms are manifestly developments of indigenous plants, such as Idria columnaris, which is nothing but a peculiar Fouquieria, Yucca valida is nothing but a form of Y. australis. There are, however, a number of species that have reached such fixity as to deserve recognition, such as certain Rhammaceae, Burseraceae, Euphorbias, etc. The giant cactuses, so far as I can discern, all belong to one specimen of Cereus such as C. calvus, Pringlei, Titan. This is also true of the Washingtonias, all modifications of W. filifera. The Erytheas seem to divide into three fairly well differentiated species, such as the green edulis, the blue armata and the pipestem-leaved Brandegei, all generically different from Washingtonia filifera. In the southern half of the peninsula the only Yucca is australis. The Agaves are still in a wild state of confusion, as are the oaks, because the species are founded on individual herbarium material mostly, by men who do not know what a species is.

There is no doubt that the Laguna mountains, which form the backbone of the southern end of the peninsula, actually extend up and out of the Tropical as to their actual summits. But up to the present time no real study of zonal conditions has been made in them. In addition there has arisen much confusion as to what are their limtations. The term

Victoria mountains can apply only to an insignificant sub range near Cape St. Lucas, and the term Sierra Giganta can apply only to a high area north of La Paz. But this does not reach high enough up to have any special significance, compared with the great Laguna area.

I believe that it is absolutely necessary for any student of ecology to be familiar with the limitations (morphological) of each zonal guide so as to give due credit to the evidence obtained thereby, and when this is done this guide becomes of inestimable value in limiting zonal boundaries.

NELSON AND LIFE ZONES

Nelson, head of the U. S. Biol. Survey, in his memoir of the American Academy on Lower California, tries to perpetuate Merriam's monumental blunder in life zones by keeping up Merriam's system of separating the Temperate from the Tropical, calling the life of the lower part of the peninsula Tropical and drawing the zonal limits at least 500 miles too far south. In addition in his map he makes another serious blunder in mapping the life zones of southern California where he represents the entire littoral flora and interior flora up to the bases of the Sierras as "Upper Sonoran," when in fact it is Merriam's Lower Sonoran, which in turn is truly Tropical, as shown by me in Contributions No. 13. Grinnell also has made much the same blunder in his discussion of the zonal limits of northern Lower California. The reason for this is that neither person has taken into account the annual temperature of the regions dealt with, which is in excess of 60 degrees Fah. Most of the botanists of southern California have fallen into much the same error, all because they did not find a suitable zonal plant to check up on the western side of the mountains, where the annual humidity was so high. On the eastern side of the mountains, the desert side, the Larra is a conspicuous zonal plant, serving well to separate the Lower Sonoran of Merriam from the Upper Sonoran of Merriam, whose characteristic plant is Juniperus Utahensis. Now on the western side of the mountains, because of the high humidity the Larrea is not found, but its place is taken by Adenostoma fasciulatum, which is an admirable zonal plant and enables the acute observer to draw the limits of the zone nicely throughout the entire area as far north as Eureka, California, and enables one to correlate the other plants in their proper zones. This reveals the fact that the flora of the plains of California from San Diego to Eureka, California, including the great inter valleys, is Tropical, that is, Lower Sonoran, up to an elevation of 5,500 feet in the San Bernardino and San Jacinto mountains, and about to Colfax east of Sacramento. Hall and others have tried to dodge the matter by devoting much to what they call the chapparal belt, which is nothing but a drainage proposition, having nothing to do with life zones.

I have recently returned from a long trip throughout the region covered by Nelson, and can say with precision that if the Larrea and Fouquieria are not Tropical plants then there is no Tropical. About that I shall treat more in detail elsewhere.

ZAUSCHNERIA

Zauschneria. In the American Journal of Botany Vol. 16 pp. 58-68 Martha Hilend publishes a carefully prepared monograph of this genus. The only criticism I would make on it is that her conception of species is not the correct one. The result is that she recognizes four species where there seems to be but one. I have grown the California form common in the mountains of southern California, and the form which grows in Utah, in my garden for years. The variations that appear in the plants as they grow are entirely too wide for recognition of any but one species. She freely admits intergrading of all the species known to her, but in spite of that fact she upholds four species. This is not the traditional conception of species.

It goes without saying that everyone has a right to publish anything he sees fit, the same right others have to criticise whatever is publsihed. But there are certain things which long observation in the field show to be true, and if there is anything established it is in the main species are well defined in nature. A few species and a few genera are in a state of flux. In addition there is more or less hybridizing in related species and some genera. But the fact of the status of a species is determined by observation. But when there is constant gradation between so-called species, the conclusion is obvious that they are not good species, and any other conclusion leads to chaos. The person who follows such a course must land in the camp of the splitters, who in the end commit botanical suicide.

COLLINSIA

Collinsia. Vesta Newsom, of Pomona college, has recently published a monograph of this genus. It appears to be a very conscientious revision along accepted lines. I have not yet had the time to go over it critically to determine its real value, but it appears to be a piece of work well done.

TANTILLAS CANON

Tantillas Canon. This locality where Orcutt got several types of new species has been a region of much fruitless search for years, and no one has ever been able to find it. Trelease speaks of the "Tantillas mountains" but there are no such mountains. One author speaks of Tantillas canon as being a few miles south of Campo, but no one has been able to find any such canon south of Campo. In fact there is no such canon there. Then the question is where is it?In May 1928 I set out with Mr. Reed of Riverside to find this mythical region. We went direct to Mexicali, hoping to find someone there who could direct us. We found two men old time prospectors who had tramped the entire region for years back, and who knew every canon. Mr. Gonsalez the sheriff of Imperial Co. whose residence was in Calexico volunteered to solve the riddle for me, he said there is no such canon. But there is a Tanqui canon, where the first palms south of the California border grow, and

he stated that this might have been called Tanquilla canon by some. Tanqui canon means the canon of tanks, water-holes, and Tanquillas would mean little tanks. And this is what is found at Tanqui canon. The significance of this canon lies in the fact that this is the first and only place where water is to be had south of the border, and therefore would be the rendesvous for men traveling by burro. It was for a long time an Indian settlement. There are two groups of palms, the first a little niche in the range where water seeps and where about 40 palms grow now. None of these trees is over 30 feet high. Thy were fruiting copiously when I was there. All belong to the typical species now called Washington filifera, and none are like the var. robusta. The petioles vary from very spinose to almost bare of spines on the same tree, and the leaves are very filiferous. The flowers seem perfect, but few of them set. The flowers are about ¼ inch long and are white. From beneath each bract on the rope-like peduncle arises a panicle of flowers which is about six to 18 inches long. The floral cluster droops and is 6-8 feet long, longer than the reflexed old leaves, being composed of about half a dozen panicles and each panicle subtended by a long sheathing bract which splits with age. The lower bracts are often a foot or more long. The leaves are apple-green, the blades being about 2 feet long, and each section copiously filiferous with white threads.

In the Botany of California vol. 2 p 2II, and in Proc. AM. Acad. II 146 I867 Waston first uses the term "Tantillas Mountains". So to the illiterate Dr. Palmer rather than to Orcutt belongs the stigma of inventing the mythical canon, though Orcutt used the term "Tantillas Canon." Palmer was notoriously ignorant. The thing that arrests the interest of botanists is the type locality of several new species attributed to Tantillas Canon by Orcutt. It is now certain that Orcutt did not get the new species accredited to the canon at the tanks, Tanqui Canon, but on the road between Campo or the Valley of Palms and the Canon, or in going over the range to the south of Campo. The exact locality cannot now be determined till someone follows the old trail from Tia Juana to the tanks and at the right season for plants, and collect botanical species there. Brandegee in Zoe, 88 speaks of "Cantillas Canon" as being a few miles below the boundry near Campo, but there is no such place.

CLEOMELLA

I confess complete sympathy with the attitude of Parish in his criticism of Payson's treatment of this genus, only Parish was too mild. Payson seems to have had very little experience with the genus, not enough to give him any proper idea of the effect of ecological conditions. I also confess decided opposition to Robinson's treatment in the Syonptical Flora. An example of the latter is where Robinson speaks of the absence of stipules in the genus except in obtusifolia. Now I have examined about all the species and find stipules in all of them, but they are fugacious, but readily seen in young parts. Another case is where Robinson speaks of certain species having "axillary flowers". So far as I can find most of the species have the lower flowers axillary. But this character varies apparently in the development of the individual. An example is in C. Palmerana Jones. The type material is relatively young, the main floral axes not yet fully developed. This makes the flowers seem to be peculiarly axillary. Just the reverse of the case in C. longipes its nearest ally. The type of C. nana Eastwood is from almost the exact locality where C. Palmerana was gathered. At the time I gathered C. Palmerana localities were not so definite as now. It would now be called "road to Courthouse Wash." In those days Green River was the only town. Even Thompson's Springs was only a railroad name then. Probably Valley City would be the best name for the type locality now. I some years ago and after went to the type locality to study further my C. Palmerana and found only the form of Miss Eastwood. No real revision of the genus can be made till it is grown under normal conditions and variations noted in the field. The attmepts to base characters on the comparative length of the filaments, and stipes are puerile. The development of horns on the pods is a matter of maturity only. Rydberg, who knows nothing of ecology and cares less is expected to make species on bug holes and accidental variations, and few people take him seriously any more. His C. cornuta founded on a specimen of mine is an example.

Taking up Cleomella as treated by Payson we find him splitting C. longipes into Hillmani Nelson and C. Macbrideana Payson. My material from Reno which includes all of Hillman's being the type of Hillmani. Rydberg takes my specimens gathered at Cainville, Utah No. 5656 as the types of his C. cornuta. This I had referred to C. longipes. The specimen is beginning to be mature, having a few ripe pods below among the leaves. It has the same kind of leaves which mainfestly place it with the longipes group. But the bracts of the inflorescence are all reduced to small and hyaline scales except now and then a natural leaf-life bract. I find the same tendency only once in a while in longipes where most of the bracts even to the very tip of the raceme are green. There seems a trend in the genus for pods to be oblately diamond-shaped, one group having the tip truncate with greatly developed horns on each side. The other group has the pods wider below giving more or less of an ovate outline, but horns variably developed. Now cornuta

has the pods of the latter group and the leaves of the former. The former group has flat and wide leaflets very obtuse to retuse. From the leaf structure I would at once place cornuta with longipes where I have always put it. Then we have Miss Eastwood's C. nana, got at the type locality of C. Palmerana which belongs here with the latter, and which has the scale like upper bracts just as in C. Palmerana. Miss Eastwood's specimens of C nana are evidently young with pods not yet fully developed, and to my mind are certainly C. Palmerana, which in turn may deserve separation from C. longipes. C. Montrosae Payson, from the leaves would seem to belong with C. oocarpa. To this species also belongs C. plocasperma and Coville's proposed stenosperma which Payson ignored. Then we have C. obtusifolia to which belongs C. taurocranos Nelson, and the var. pubescens Nelson which is a form of the type. What we shall do with brevipes and gracilis I will leave for more field work. There is no doubt that the splitters are seemingly justified in making so many of Cleomella, for the characters given seem abundantly distinct at first sight, but the more material one has the less weight he gives to distinctions recognized by Watson and Gray. It is manifest that the developemnt of filaments is a matter of little weight. The leaf characters would seem to be more permanent. But when we come to study them we find them varying toward the linear group, but after all can it be possible that longipes can include cornuta and Palmerana? If so we shall have to reconstruct our ideas of Cleomella. The distribution of the genus is sporadic. On page 38 Payson speaks of C. "refexa". What he means by that remains to be seen. There is no such species so far as I can find. I am convinced that too much emphasis has been placed on morphological characters, and that ultimately we shall have to kill more than half of the recognized species. But this can be done only by plant breeding. There is nothing to show that C. brevipes is anything but depauperate form of parviflora. C. gracilis Brandegee is probably C. parviflora. C. Mojavensis Payson is manifestly a form of plocasperma. C. Hillmani is of course C. longipes.

Recently I have had an opportunity to study certain species in the field to determine the relative value of specific characters. The species observed are obtusifolia and plocasperma (oocarpa). Certain vegetative characters are constant. C. obtusifolia always has the short obovate and folded leaflets, and on the young parts are the papery and hair-like stipules at least, though mostly the plants are conspsicuously pubescent throughout and the stipules very prominent. The stipes are always reflexed and the styles long. The pods vary from obliquely diamond-shaped to almost transversely linear because of the development of the horns or valves. The most marked character is in the habit which is prostrate, forming mats often 4 feet wide on the ground because of the multitude of branches spreading out wand-like over the ground. The flower clusters are almost sessible and innumerable. Once in a while the central stem rises erect several feet but always surrounded by the spreading branches. No other Cleomella has this habit. Cleomella plocasperma on the other hand had the habit of Cleome lutea, that is, erect

and branching widely in the middle, each branch terminated by a long raceme of yellow flowers with green and leaf-like bracts. The plants are often 4 feet high, growing in sand, never in alkaline clay, and having like all the other Cleome and Cleomella species the apparance of being immigrants. Usually the lower leaves have fallen and the stems are bare for a foot or two above the ground. The development of the pods is a matter of humidity at the time of ripening. Nearly always the pods are ovate in outline during the dry summer, but the earliest pods (found subtended by leaves) have the horns developed. Certain groups occur in the genus. The group having the pods widest below the middle contains C. cornuta and plocasperma; the group having the pods widest above the middle embraces the other species. C. Mexicana I do not know. This may belong in the first group as it is described as "globose-ovate."

Cleomella brevipes is represented in my herbarium by various specimens but I can find no character separating it from C. parviflora. Miss Eastwood's C. alata is manifestly the same thing.

CRUCIFERAE, BY PAYSON

In a recent revision of certain Cruciferous genera Edward Payson, a graduate of the University of Wyoming gives certain views which differ from the accepted ones. The question is "Are his ideas based on correct scientific grounds." His chief reason seems to be discoveries in genetics, but to the casual examination they seem to be an attempt to make a case out of little or nothing, special pleading for a purpose.

The first question is "what is his equipment?" A graduate of the university of Wyoming which is presided over by Aven Nelson who is without an exception the worst blunderer among western botanists, and without ecological experience sufficient to conduct such studies. He (Payson) has had little field experience. His work is that of a closet botanist. This does not necessarily imply that he is incompetent, but such botanists have, much to the detriment of systematic botany, been altogether too much in evidence. Then do his ideas on phyogyny meet the approval of field experience and of other botanists?

On p. 7 he summarizes so called evolutionary tendencies in Sisymbrium as follows:

(1) An annual habit of growth is more primitive than the perennial.

(2) A stipe or gynophore is believed to be a primitive character.

(3) A long, terete pod is more primitive than a short or compressed one.

(4) In the primitive species the petals were probably purplish rather than white or yellow.

(1) This idea was held by Gray as is shown by his systematic keys.

Many others hold the same views. Payson is adding nothing to accepted theories in this. But is the idea a true one? The annual habit is the product of seasonal influences mostly cold of winter which is a recent element geologically. All the primitive species of plants were perennial. The annual habit is the product of the attempt of plants to adjust themselves to new conditions, and in adapting themselves to them certain organs and appendages became useless and aborted. Therefore the absence of certain organs is more a reversion than an evidence of primitiveness in annuals. The problem could be attacked in another way by checking up the development of special organs in annuals.

Are annuals specially deficient in dissection of leaves or pubescence? We think not. Are they lacking in essential oils? Certainly not in the Capparidaceae. The Cruciferae nearly all lack glandular appendages, and yet they are assumed to be derived from the Capparidaceae family. But in all probability the reverse is the case, in spite of the special floral characters. When we come to study the genera of Cruciferae we find a higher development of floral characters in those genera assumed to be nearest the Capparidaceae, namely Thelypodium, Stanleya, Streptanthus, Caulanthus, than in Draba, Arabis, Sisymbrium, Erysimum, many of whose species are annual, while the enumerated are with few exceptions annuals or biennials. It is true that Payson says conclusions cannot be based on small numbers of species, but he goes ahead and does it just the same. Very few of us older field botanists would even now have the temerity to try to explain genetic origin of western plants, but inexperienced young men feel competent to do it. To go into details on this point would take too much space here.

(2) That a stipe is more primitive and its absence less so would be very hard to prove when we consider the stipitate genera and species. That the specialized genus Stanleya is lower than Draba, Arabis, Lesquerella, etc. I do not believe, or that the still more specialized genera Caulanthus, Thelypodium, and Streptanthus are lower than they, would be unique. In the nature of things one is going far back to assume that stipitate pods was the rule in primitive species, as far as he would go if he assumed that pine cones to be primitive should have had definite axes between the scales, when the probable fact is that when the pines originated the axis had already been aborted.

(3) I fail to see any cogency in the assumption that a long and round pod is more primitive than a short and flat one, for the reason that the last specialized pods are mostly short, at least not elongated, and are not terete. Most of the terete pods have a tendency to the development of secondary ribs along the middle of the valves as is shown in Erysimum, Caulanthus and Sisymbrium, which is distinctly not a primitive character.

(4) Very likely Payson will say that his conclusions as to these evolution factors is meant to apply only to the Sisymbrium group. In reply I would say that this throws the burden of proof all the more on him. Under this head he assumes that the original species were

purple-flowered rather than white, Why? presumably to strengthen his reference of certain Thelypodia here. I have never yet seen a yellow flowered species except in Stanleya. All the rest are greenish yellow if at all so. Practically all the species of Thelypodium, Caulanthus, and Streptanthus have petals fringed with purple the body being greenish and whitish, this includes Streptanthus longirostris which is a good Streptanthus, where Watson placed it at last, and apparently is congeneric with T. Cooperi and deserti. His reference of Thelypodia to Sisymbrium is made under excessive strain, and he still more disrupts that genus to do it. It is not a question of the existence of taxonomic difficulties. These we all admit, but the question is on the expediency of treating them. Rydberg in his usual way cuts the Gordian knot by making new genera, but this does not at all solve the question of relationship. It is still there. It is a short cut to avoid explaining the genetic tangle, and it is not scientific, but it catches the eye of the ignoramus, who at once begins to toot the wonderful insight and discoveries of Rydberg, when in fact he is only repeating what we older botanists saw and published when he was in knee pants.

Taking up Sisymbrium as Payson treats it we find it sometimes hangs on white or yellow flowers and always on a stigma lobed at right angles to the valves. What he would do with those species of Thelypodium which have no lobed stigmas he answers by assuming that they would be lobed if they had a chance, and would go where he has placed them. May be so, may be not. He also says that the septum is never that of Thelypodium. But an examination of my T. elegans shows the same cell arrangement often as in other species which he retains in Thelypodium, this is where the septum is narrow, then the cells are contracted and elongated. This distinction shades to nothing in this species, doubtless it would also be in T. ambiguum. It is difficult to reconcile one's views of Sisymbrium to admit such clear species of Thelypodium as T. elegans and ambiguum into it. There seems some reason for putting S. deflexum there, which has stigmas lobed both ways, and the liear-leaved Thelypodia of the Arizona region, there, for they are somewhat aberrant in Thelypodium, then the pods have the tendency to thickening of the centers of the valves into ribs as in S. altissimum. I certainly would not place Thelypodium Cooperi in Caulanthus as it along with my T. deserti seems to be more congeneric with Arabis longirrostris which I think belongs best in Streptanthus. The thickening of the pods is still not enough to make it round or to destroy its flatness. To me there seems a lack of consistency in going to such lengths as to unite half of Streptanthus with Caulanthus, which Payson does, while keeping up Sisymbrium on stigmatic lobes which are not even present in some of Thelypodium. It may be contended that Watson and Gray did not solve the problems of relationship by their treatment of the family. We grant this without a moment's question, but what of it? It is no reason why others should do worse. In certain quarters there has been for a long time a tendency to discredit Watson's work, but he had more ecological horse sense and good judgment than any of his succes-

sors, and his monumental botany of the 40th paralle has never been equaled for quality of work since, though it has been followed as a guide by men too selfish to give credit where it belonged. He was a pioneer. Had to solve relationships entirely unknown to others. A study of the genera of Cruciferae to determine just how much worth is in the work of Payson has revealed to me certain things which lack of time had prevented my knowing before. For example, Erysimum and Sisymbrium are simply hodge-podges. It is out of the question to consider E. cheiranthoides as congreneric with the rest referred to it. Therefore I incline to keep up Cheiranthus. Sisymbrium is more muddled, and Payson only contributes more fog. In his treatment of Thelypodium he makes a great ado about the markings of the septum as distinctive, but the sections here shown reveal his fallacies. But he fails to consider the septum of the other genera. Climatic influences seem to determine the peculiar markings largely. At the north the veins or cell walls are nearly always crimped, at the south nearly always straight or nearly so. Individual species vary much in this regard. It certainly is amusing to see Thelypodium Cooperi put in Caulanthus along with Sisymbrium reflexum, and see Streptanthus longirostris which seems almost congeneric with it (Cooperi) put in Streptanthella. Mr. Payson does not seem to regard certain morphological characters as of any particular value, such as the peculiarly stout and rigid floral peduncle, so characteristic of S. altissimum, and reflexum. Nor does he seem to know how greatly the two species differ in the meshes of the septum. S. altissimum is properly called the type of the genus Sisymbrium. It has false partitions between the seeds, remarkably developed walls to the pods, as well as woody and very rigid reflexed pedicels, quite different from S. canescens group, while the S. reflexum group is intermediate, then all these are annuals. Watson sidesteps these complications by saying that the Cruciferae form natural groups, his use of the term natural being intended to mean evolutionarily natural, since he was a believer apparently in natural selection as the causative element in plant development.

Speaking of the idea that annuals are more primitive than perennials, an idea which I certainly combat, the great genus Astragalus is a conspicuous example of the falsity of this fetish, practically all the highly developed species of this genus are annuals. This can be seen by reference to my monograph. The fact that this is characteristic of Astragalus does not prove that it is a universal rule of course in all genera, but presents presumptive evidence therefore.

It is evident to western botanists that the genera Thelypodium, Stanleya, Streptanthus, and Caulanthus are developments of very recent times, from older genera of the Sisymbrium-Arabis type, all of which are stipeless. This therefore leads to the assumption that stipes are not primitive as Payson has assumed, but the last word in specialization. It is going far too long a distance into the unknown past to resurrect the axial habit and call the stipe a long lost pedicel, as Payson does. Geological history shows only too well that certain types of forms early became fixed and were built upon in the later genesis of species without

reverting to the types from which those types originally came. Just as w have in the genesis of organic chemical compounds where the ammonia radical became to all intents and purposes an element like sodium, oxygen or hydrogen, and was built upon to form the complex derivaties of Carbon. There are various ways of getting at the primitive types of modern vegetation, but theoretical assumptions do not cut much ice in the matter, particularly when made by young men with little experience. Ultimately the matter will be settled, but not till after exhaustive field work, by men who know ecology in all its ramifications.

Taking up certain species of Thelypodium, it is impossible to follow Payson in his recognition of species or genera. He puts T. elegans in Sisymbrium because it has stigma lobes transverse to septum, but he puts T. ovalifolium the cotype of which is in my herbarium and all of which I collected at Panguitch lake Utah, in Thelypodium because it has no stigma lobes, but the specimens in my herbarium have lobes both transverse and parallel to septum, and therefore the species according to him is a form of elegans, but really is T. sagittatum. There are specimens in my herbarium with both transverse and parallel lobes on the same plant. This shows the extent to which Payson will go in trying to establish his foolish reference of species of Thelypodium to Sisymbrium whose species S. altissimum cannot be congeneric with any of them.

Taking up T. integrifolium we find him splitting it up into T. affine, and rhombifolium, and the var. gracilipes. We find him making much of the flattened pedicels to keep up rhombifolium, but he is inconsistent in his reference of specimens. My fine material from Moab which he refers to rhombifolium is typical var. gracilipes with stipe 2 mm. long and linear spikes, and has conspicuously flattened pedicels. T. lilacinum seems to be another of the fictitious species, the distinctions do not hold. T. affine cannot be upheld on the characters given. I see no other way than to unite the four species.

Payson says on page 281, in quoting localities for Thelypodium lilacinum var. subumbellatum "Hot Springs Wyoming Jones." I never was there, and no specimen of mine is in any herbarium with such a label.

Payson follows Greene in putting Sisymbrium reflexum into Thelypodium ignoring completely the strikingly similar pods to altissimum in their structure and cell character and apparently not seeing the relationship to Arabis longirostris and Thelypodium Cooperi, etc. T. lasiophyllum does not have the septum cell structure of any other Thelypodium, but this is variable. The septum is thin as in altissimum but is bulged into pockets as in that species by the thick seeds, but the flowers more nearly resemble those of Arabis longirostris in color. The inflorescence reminds one of Sisymbrium officinale but is less strict. The two forms with erect pods and reflexed ones if they did not grow together would create a distinction, supposedly specific, but I fail to see any thelypodioid characters warranting placing the species there. The preponderance of characters is sisymbrioid. There seems to be a difference in the forms on the Coast and the interior in the septum. The Coast one being more sisymbrioid. Both he and Robinson say that my Thelypoddium

neglectum is mixed, founded on two genera, but my type specimens are clearly S. reflexum, and not mixed.

Payson's treatment of Thelypodium, Caulanthus, and Streptanthus well illustrates the foolishness of a closet botanist trying to monograph a genus. He evidently has had little first-hand acquaintance with the genera. Watson in erecting Caulanthus made an admirable statement of the differences. Caulanthus and Streptanthus stand firmly on the floral differences which are marked in the fresh plants, namely leathery petal claws wider than the blades which are rudimentary or mere prolongations of th claw. Thelypodium having thin claws papery and smaller than the conspicuous blades, and rounded pods. Caulanthus has the rounded pods and peculiar floral characters given. Streptanthus always has the flattened pods, often quite wide, and flowers mostly inflated, the only aberrant form being S. longirostris which connects with Thelypodium. The placing of lasiophyllum and Cooperi in this genus could not be worse, while the merging of Streptanthus with Caulanthus has no justification.

Caulanthus hastatus when critically studied in the field shows all of the characters of Caulanthus and does not justify being put in a separate genus Chlorocrambe of Rydberg, though the flowers are too small for Caulanthus. We do not expect anything else from Rydberg because he has no generic nor specific conceptions, his inspirational botany having gone flooey.

Lesquerella condensata Nelson. Payson in his treatment of this species pages 211 and 212 still further balls up things which were in a terrible mess before. Nelson in describing this species says it is the most common thing in and around Laramie in the spring, and that it is what he has distributed as Draba glacialis. Now what he distributed to me as Draba glacialis from Laramie is the var. laevis of Payson. Payson without any authority states that the type of L. condensata is Nelson's No. 4797 from Tipton Wyo. But in the locality where the type was described he (Nelson) does not mention Tipton but specifically does mention Laramie, and he does not mention 4797 as the type but does mention his No. 1218 as the type of the species, which is a part of the type of Payson's var. laevis. Nelson is always a blunderer but we cannot go beyond the original description for authority as to what was the type of the species when it is distinctly stated there as to what is the type. So the peculiarly hairy form still is unnamed.

Eventually there will be difficulty in separating this species from L. intermedia. The plant is common on both sides of the Uintas, the type grows on the northern side of this range. On the southern side of the range from Dragon (near Mack Colorado) I have found it as far west as Theodore (now called Duchesne) on the benches bordering the river. In this region the species reaches a better development where extreme forms have filiform stems 2-3 inches long with rhomboidal to oval leaflets, but varying to linear-oblanceolate, on long and slender petioles, and even the narrow stem leaves are on slender petioles. The shape of the stellate hairs is the same as in the var. laevis, but there is no tendency

to the pilose condition in any of my material. The flowers are in heads, rarely more than half a dozen in a head, and the pods rather corymbose, ovate, acute, decidedly flattened laterally when young and less so when old, white-stellate, with styles 1.5-2 mm. long, pods 3-4 mm. long, the slender pedicels are 3-4 mm. long and erect. Were it not for the wide leaves it would readily be placed in L. intermedia, for that has similar hairs. The pods vary from ovate to oval. If the caespitose habit were constant in certain species they would be better known, but where L. intermedia is either long-stemmed or acaulescent the habit is not of much account.

My particular reason for going into Payson's work on the Cruciferae is that I have for over a year been devoting all my time to a critical study of the Cruciferae, and incidentally have had to go over all of Payson's work in the family, checking up in the field as well as in the herbarium, to find just what is worth preserving and what is not, in his work. It is to be regretted that such a young botanist ever took up this family, but one is justified in saying that his work on Lesquerella is the least objectionable of all he has done on the family. It is always painful to have to go over the work of inexperienced persons in systematic botany, but their teachers seem to regard this as legitimate to portion out certain genera for them to muss over.

Payson was a lovable man, one whom everybody who knew him regarded well. His first work was rather crude, but he steadily improved as he went on. We all regret deeply his untimely demise.

NOTES AND NEW SPECIES OF UNITED STATES PLANTS

WASHINGTONIA, WENDLAND

This genus, proposed by Wendland as distinct from Pritchardia, in the year 1879, has been variously treated. The name antedates all others, but was foolishly thrown into synonymy by Sudworth to the assumed publication of a Washingtonia (Osmorhiza Raf) by Rafinesque, and called Neowashingtonia by Sudworth. Parish has shown the uselessness of the name Neowashingtonia. In the botany of California (1180) Watson proposed the separation of certain species as Erythea, and on the flimsiest of grounds. There is no treatment of the genus by anyone but Parish that shows any familiarity with the plants as they grow. Parish knew the genus as represented in the wild Washingtonia robusta of our Californian deserts, and he knew the other forms of filifera as cultivated in southern California. But he does not seem to have studied the floral characters much if any. So far as I can find no one seems to know if either Washingtonia or Erythea has perfect, or monoecious or deciduous flowers. I find that all the forms of W. filifera described below are either monoecious or dioecious or perfect. Whether the flowers are polygamous I do not know. The flowers are about 1 cm. long and white. The fruit is

black and about 4-6 mm. long and 3-4 mm. wide. The form Sonorae, as it grows in the Cape region of lower California is mostly staminate, rarely does one see a pistillate tree, or even a monoecious one. The leaves of all forms of filifera hang on for many years as a rule, but there are occasional exceptions where they fall off quickly and leave the trunks bare, at least in forms of Sonorae. A character that is common to all the palms is the production of subcutaneous rootlets which swell out the bark at the base of the tree and finally make it split as in Phoenix. When the leaves of filifera have fallen naturally they leave the trunk with very slight rings which are not sharp on the edges, as in the cocoanuts. Watson in his characterization of Erythea makes woolly spathes a generic character, as well as perfect flowers. The spathes of E. edulis are woolly, those of E. armata are perfectly smooth. The flowers of E. edulis are evidently polygamous or monoecious as are those of E. armata at least at times, but there are dioecious trees. The flowers of both species of Erythea are greenish white and 2-4 mm. long. The fruit of E. edulis is black and edible and about an inch wide. That of armata is half as large. The leaves of edulis fall off in 2-3 years, leaving sharp rings around the trunk, and exposing very conspicuous sheaths between the leaves which are about a foot wide. In E. armata these sheaths are less than half as wide but still conspicuous. The leaves af armata hang on for years as in W. filifera. The threads of filifera are not so conspicuous in Erythea as in most Washingtonias. The petrioles of E. edulis often have minute prickers, which seem deciduous. Those of E. armata are like those of Washingtonia filifera. There is not a character proposed by anyone for Erythea to separate it from Washingtonia that has any value at all, but there seems to be a character of value in the flowers (see beelow).

I can see no sound foundation for Cooke's genus Glaucothea. The flowers are the same as in Erythea edulis. The fruits are intermediate between Erythea and Washingtonia, and the leaves and habit are of Washingtonia.

It has been my privilege to see the cultivated forms of Washingtonia in southern California. I have also visited all the large areas where var. rubusta grows wild, and have also studied it in cultivation all over the region. I have also studied the genus all along both coasts of Lower California and on the mainland as far south as Guadalajara, through Sonora, Sinaloa, and Nayarit, and at the Cape. In Mexico the plants can hardly be said to be cultivated, except in the Mexican stupid way, having grown up along watercourses haphazard, the original seeds probably having been scattered by man after obtaining them from the canons of the adjoining mountains, and for the purpose of having the leaves nearer at hand for thatch, rope, and baskets. The Mexicans distinguish forms by the color of the wood, calling them "Palma colorada and Palma blanca, and Palma negra. W. filifera goes by the names palma blanca and palma colorada. Erythea armata and Brandegei are called palma negra.

The only form that grows wild in California is Washingtonia filifera var. robusta (Wendl. Gart. Zeit. 2 198 1883 as species). Parish Bot Gaz. 44 420 1907. It is a well marked form, and the best developed of

them all, the trunk at base being 3-4 feet thick and tapering to a foot in diameter at the tip, which is often 75 feet high. When in a state of nature this form is instantly recognizable by the great sheath formed by the dead leaves which overlap so as to form a perfect sheath in which the individual leaves do not appear. This sheath is 4-5 feet thick, and often 20 feet long. When the leaves have been cut off for thatch or by fire there is no certain way of identifying this variety. The leaf blades are 3-4 feet long, usually a little shorter than the very stout petioles. The blades split into many narrow blades that droop at the tip, but blades never split to the middle. This form is conspicously filiferous, the divisions tapering gradually to the tip. The petioles are inclined to terminate in triangular-acuminate prolongations into the leaf-blade, but vary greatly and the margins are hooked-prickly with stout and dark spines throughout or only below. The petioles are mostly 2-3 inches wide and an inch thick and lunate in cross-section. Many plants are dioecious, many monoecious. The globose-oblong fruits are hardly 4 mm. wide. The flowers are borne in long and interrupted panicles, in which the fruits droop, having alternate sheath-like bracts subtending each panicle, which bracts are tightly fitting and smooth and 1-2 feet long and 2-3 inches wide. The whole flower cluster is often 4-8 feet long and drooping. The nearly round peduncle makes good canes. The leaves are universally used for thatch, which fact accounts for the wide distribution of the species. The trunks often reach 75 feet in hight, and then are seldom over 6 inches thick. They are very rigid and seldom wave in the wind. The wood is very heavy, but porous. The trunks are about the only straight timber in the country and are therefore much used for rafters, house timbers, and corral poles. But I have never seen them sawed into plank. The rootlets produced from the lower part of the trunk in age seem to be a part of the wood and are very conspicuous in fossilized specimens, occurring in the desert beds of late Tertiary age.

The typical form of the species W. filifera (Linden Ill. Hort. Lem. 24 1877 as Pritchardia) Wendl. Bot. Zeit. 37 68 1879 is badly mixed in Bibliography both by Watson and the Kew Index. I am not prepared to maintain its distinctness from Pritchardia, since I do not know the species of that genus. I therefore assume that Wendlend is right in its separation. The typical form of the species is not the magnificent form (robusta) of our California deserts but a slender tree which grows in the canons of northern Lower California, and which seems to have first been introduced into cultivation. The trunks in this form are seldom 2 feet in diameter at the base in cultivation, and rarely reach six inches wide at the tip. The chief characteristic of this form lies in the relatively short leaves (blade about 2 feet long), which when old hang down and form a ragged sheath, unsightly to look at, where the individual leaves are conspicuous. The pleats in the leaves are relatively wider and do not droop so much, a form (W. gracilis Parish) having divisions shortly acuminate and with few threads on the margins. Seeds of this were the first to be cultivated.

Washingtonia filifera var. Sonorae (Watson P.A.A. 24 79 1889 as species).

This is the exclusive form in the southern part of Lower California,

and is the most graceful of the species. It has the trunk of typical filifera and the leaves of the var. robusta, but not so long, but each pleat in the leaves of the mature trees splits off from the rest of the blade at least to the middle and droops and, like the aspen leaves, is perpetually fluttering, and is long-linear. The threads on the margins vary greatly, and usually get tied into knots after a while, suggesting little nests, or fungus nodes. This form is either monoecious or dioecious or perfect. There seem to be far more male trees than female. This extends northward at least to Guaymas. All the leaves of all the forms of this speciies are apple-green. This variety has a wider range than the rest. It is abundant in the canons of the Laguna mountains, along the water courses and also grows among the live oaks on the hillsides about 3,000 feet altitude and up at least to 4,000 feet altitude. It is also common around all the settlements along the river beds, growing with the cocoanuts. It grows at tidewater at La Paz, where its roots extend down to the sea level.

The fruit of Washingtonia filifera as grown in southern California occurs in long and drooping panicles, the whole longer than the leaves, having strap-shaped bracts about a foot or two long and 2 to 3 inches wide and white, and very conspicuous beneath each cluster of flowers, the clusters hang racemosely from the whiplike peduncles, much as bunches of grapes, one cluster beneath each bract. The green fruit as it nears maturity is rather brick-colored, becoming when dead ripe a shining black, and a little oblately spherical and about 5 to 6 mm. long, with a juicy and sweet pulp about 1 mm. thick inclosing the single seed, which is almost reniform and hard and bony. The fruit is ripe in November, and the trees begin to bloom in June, as a rule. The trees appear to bloom every ten years or thereabouts.

The flowers of Washingtonia filifera var. robusta have the calyx cylindrical and with erect and very short lobes. The corolla lobes are reflexed abruptly at end of calyx and are pearly white when fresh, and about 1 cm. long, becoming dirty with age. The filaments are subulate and with versatile anthers linear and arched.

On Dec. 14, 1928, I had an exceptional opportunity to study the critical palms of our region, in company with Mr. Thackary, and with others of the Yuma Exp. stations. In the last two weeks the Washingtonias have come into full fruit, and seeds beginning to fall throughout southern California. This recent trip enabled me to see the type locality and type trees of Cook's Washingtonia Arizonica, and Erythea Brandegei in fruit. The specific margin between E. armata and E. Brandegei is very slight, and hinges on the panicle of flowers in Brandegei which is that of edulis, that is, an open and wide panicle of uniform structure throughout, about 3 feet long by 1.5 feet wide, and decidedly shorter than the leaves and on a short peduncle. The seeds are those of E. armata, and the leaves differ but little except that they are green and only slightly glaucous in Brandegei. Otherwise there is no noticeable diffrence in the two species. They have the same slender trunk, and narrow petioles, the bases of which hug the trunk closely and remain on for many years, the trees not being self-pruning as in edulis.

The seeds of Washingtonia Sonorae are exactly those of typical filifera, that is, 5-6 mm. long, about 4 mm. thick, oval-ovate to oval-oblong, black and shining or with a glaucous bloom, round in cross-section except a little flattened on the chalaza of the seed. The pulp is less than 1 mm. thick, is juicy and sweet as in E. edulis. When dry the seeds have a wrinkled coat from the dried pulp. The seeds themselves are decidedly flattened on the chalaza side and a little so on the other, chestnut-colored, round in longitudinal cross-section, and about 4 mm. long, and with hard coat. The chalaza is not in the middle of the side but nearer one end, and forms a scar, but not a pit as in Erythea. The inflorescence is a long raceme of grapelike clusters, the whole mostly longer than the leaves, and on a long peduncle, and mostly pendent. Each cluster has a conspicuous and white bract, 1-2 feet long by 2-3 inches wide and rounded on the end. The clusters of fruit are about as long as grape clusters, that is, rarely over a foot long, and dense or loose according to conditions, and a solid mass of hundreds of fruits. In the var. robusta some fruits are almost spherical, while others are normal.

Washingtonia Arizonica Cook is intermediate between typical filifera and the var. robusta, and has no character whatever to separate it from either specifically. About half the trees were self-pruning, the rest normal. The same fact was noticeable in W. Sonorae at the Cape. The humidity conditions of Arizona are such as to preclude Washingtonia growing anywhere except in moist crevices in the low mountains, and such localities are rare. No doubt there are other localities besides the S. H mountains where this palm grows, but so far only the one locality is known and is about 30 miles east of the Colorado river, and at an elevation I should say of 2,000 to 3,000 feet altitude. Right beside it also grows Nolina Bigelovii, also Beloperone Californica. There was no alkaline seep evident at this place as is common in Californica where the palms grow, nor was any water evident. This locality is about 75 miles north of Yuma, and about 30 miles south of Quartzite (which is on the Blythe-Phoenix road). At Brawley I found some very fine fruit of the var. robusta which was normal filifera, but at the Exp. station, 12 miles north of Yuma, a tree there of robusta had spherical fruit, and the fruit was glaucous.

ERYTHEA WATSON

Erythea edulis seems to be very prolific and with flowers perfect or rarely polygamous, fruiting abundantly along the Californian coast where introduced. The leaves have at times a suspicion of being glaucous, but lack the marginal threads of Washingtonia filifera except a very few scattered ones. They hang on for a few years but do not form the great sheaths that the var. robusta does, though they would do so if they hung on as long. The perianth is very short, not over half as long as in any forms of filifera, oftentimes the leaves have short teeth along the base of the petioles, at other times are bare. The tree is a rapid grower. On the other hand E. armata seems to be dioecious for the most part if not entirely so. And the fruits half as large (half an inch wide) and less copious. The two species are abundantly distinct Armata has conspicuous spines and glaucous leaves, and the perianth

like that of edulis. Erythea Brandegei is at once separable from all others (except armata) by the pipe-stem petioles and small leaves. The petioles of all the other species of th two genera are 2-4 inches wide, while those of Brandegi are about half an inch to two inches wide. Whether E. elegans Franchesi and E. aculeata Brandegee are good species I am not prepared to say. But I know all the species of Washingtonia as heretofore recognized, and am satisfied that they are generically distinct from Erythea (Glaucothea).

The fruit of Erythea elegans Franchesi is acuminate below. The fruit of all the rest is globose. The fruits of armata and Brandegei are about half an inch long. Those of edulis and aculeata are an inch long Leaves of edulis are not spinose, those of aculeata are spinose.

The flowers of Erythea armata are greenish-white. Calyx about 1 mm. long with the nearly round lobes very concave and lacerate on the margins and separate middle. Just below the tips of the calyx the white corolla lobes flare about 45 degrees and are deltoid-ovate and 2 mm. long and acute, the lobes seem united near the base within calyx and corolla is a cup formed by the united filaments which are scale-like and united half way up or almost to the tip and adnate below to the corolla. The elliptical anthers are nearly ½ mm. long and versatile and on a minute but evident pedicel. The ovary is 3-lobed and with stigmas about sessile.

The flowers of armata are in long and greenish panicles, the perianth at length white and 2 mm. long and parts triangular-ovate. The 6 stemens form a cup around the ovary, with the greatly expanded filaments flat and deltoid and with the oval anthers about 1-10 mm. long sitting on the tip. The cup is either complete by the union of the filaments almost to the tip, or by the parts being slightly united at base. The flowers are strongly odorous. smelling resinous, the flowers appear cup-like and rather open. At Claremont there seem to be two flowering seasons, one in May and the other in August. The fruit of edulis when ripe is black and juicy and smooth and fully an inch in diameter, globose or nearly so, or a little oblate, when less ripe is reddish-yellow The fruit never seems to be but 1-seeded. Infloorescence minutely hairy.

A character not clearly noted that separates the Erytheas from Washingtonia lies in the bracts of the inflorescence. In Erythea there is a relatively short bract at the base of each grape-like cluster which tightly hugs the rachis and is not prolonged into a leaf, and therefore is inconspicuous. The inflorescence of E. edulis is a uniform panicle 3-4 feet long, ovate to lanceolate in outline and on a short peduncle much shorter than the petioles. The general appearance of the panicle is that it is concealed among the leaves. The panicle of E. armata is a long raceme of grape-like clusters, and each cluster separate and rather distant from the next one. The main peduncle is nearly as long as the petioles, and so the panicle is exserted. The panicle of Brandegei is that of edulis.

In Washingtonia the inflorescence is about the same as in E. armata, but each cluster has the subtending bract elongated and as long or longer than the cluster. A foot or two long, and white and about 2 inches wide and like a corn leaf, and is always very conspicuous.

The fruit of armata is nearly ¾ inch wide, rather tan colored and with granular pulp, about 1-2 mm. thick, and seed somewhat oblately flattened, the pulp being like that of the cocoanut but horny, with the embryo on the flattened side, and with no milk. It is evident that oil could be extracted from the fruit. The amount of pubescence is very variable and uncertain. Perhaps the flowers of armata were better described as being perfect, as they always seem to be, but many plants do not produce seed. We have one tree at Claremont that is always sterile though flowering abundantly, near it is a tree that fruits copiously, but there is no difference in the appearance of the flowers except that the filaments of the sterile one are barely united. This follows the observed habit of Washingtonia Sonorae where there seem to be ten times as many staminate trees as fertile ones.

The floral characters of Washingtonia were not known at the time of the publication of the Botany of California by Watson. There seems to be a very great difference in the character of the flowers between Washingtonia and Erythea if the floral characters of E. Brandegei and aculeata are as in the other species. Standley in his Shrubs and Trees of Mexico does not seem to know anything about the two genera, attempting to separate the genera on the entire or split sheaths, a visionary character. While the floral characters he knows nothing about, he also says the flowers of Erythea armata are purple, when they are not. The most marked character in the genera is the anthers which in Erythea are oval and very short, tipping the greatly dilated filaments which are united below. The anthers of Washingtonia are linear and fully I mm. long, at least twice as long as in Erythea, and the filaments are subulate.

The seeds of Erythea are much flattened on the embryonic side and ½ to 1 inch wide and half as high and full of horny and oily pulp resembling the meat of the cocoanut but denser. The embryo is oblately spherical. These characters are taken from E. edulis and armata. The flowers are greenish-white and very small, not over 2-3 mm. long. The plants fruit copiously in cultivation. The pulp of E. edulis is 2-3 mm. thick on the outside of the bony shell and black and juicy but rather solid. The fruit of E. armata is nearly ¾ inch wide, reddish-yellow when mature, about half the size of E. edulis, with the outside pulp 2 mm. thick and granular and not juicy. The other seed characters the same in edulis except the size. The horny shell of the seeds is very hard. The fruits seem at first sight to be globose, but closer inspection reveals them much flattened on one side and irregular.

KEY TO SPECIES OF ERYTHEA AND WASHINGTONIA

Seeds not less than half an inch long, deeply excavated on one side. Flowers not over 4 mm. long, greenish-white, with petals but little exserted beyond the calyx, and filaments united below into a cup. Fruit almost spherical, or obypriform. Bracts short. Erythea.

Seeds not excavated on one side, less than half an inch long. Flowers about 1 cm. long, white, with petals linear and much exserted beyond the calyx and with tips reflexed. Filaments not united below into a cup. Inflorescence linear, of several grape-like clusters arranged racemosely. Peduncle elongated. Fruit not spherical. Bracts long. Washingtonia.

ERYTHEA

Key to Species

Inflorescence an open panicle and uniform throughout, on a short peduncle. Fruit about an inch or more long, black, with pulp about 3-4 mm. thick, sweet and juicy, round. Leaves apple-green.

Petioles deciduous, unarmed. 1. E. edulis.

Petioles armed, persistent. 2. E. aculeata.

Fruit about an inch long, obypyramidal. Leaves glaucescent. 3. E. elegans.

Fruit about half an inch long, round, reddish at maturity, with pulp about 2 mm. thick, and mostly granular. Leaves green or slightly glaucescent. Petioles armed and persistent. 4. E. Brandegei.

Inflorescence linear, of a series of grape-like clusters arranged racemosely on a long peduncle, the whole exserted beyond the leaves. Fruit about half an inch long, reddish at maturity and with pulp about 2 mm. thick and granular. Leaves glaucous. Petioles armed and persistent. 5. E. armata.

WASHINGTONIA WENDLAND

Inflorescent linear, of several grape-like clusters arranged racemosely on a long rachis which becomes a long peduncle below. Leaves green, with digitate rays, as in Erythea, with armed petioles. Bracts long, white and conspicuous. W. filifera.

Leaves with blade 3-5 feet long and mostly longer than the petioles, and in age reflexed and forming a compact and continuous and sightly sheath around the trunk, the individual leaves not separable as in the others. E. filifera var. robusta Parish.

Leaves with blade 2-3 feet long and shorter than the petioles, reflexed in age and forming an interrupted and unsightly sheath.

Leaves not split to the middle and tips not conspicuously drooping. W. filifera var. typica.

Leaves split to the middle into linear ribbons which droop and flutter in the wind. W. filifera var. Sonorae.

ALLIUM

Jepson's treatment of this genus in his manual shows all the marks of being done with a lick and a promise.

Allium validum Watson is named the Swamp Onion. Whoever gave it that name probably never saw it growing for it never grows in swamps, but along alpine and subalpine rivulets along bedrock where there is always running water.

Allium fimbriatum Watson. Jepson p. 218 gives the bulb coats of this species as having particularly distinct rectangular bulb-coat markings almost the same as in A. Parryi, and he adds two new varieties to it. One thing is certain about this species and that is that the markings are not rectangular and not distinct, and not in any way related to A. Parryi. The plant is very common on the Mojave desert and adjacent mountains on the east slope at low elevations. The most conspicuous character is that the flowers darken in drying and become very dark red. Another character is that most of the bulb coats are so thick that no markings are discernible at all, in fact no one knows as yet what they really are except by inference from the vegetative characters which are those of A. bisceptrum. A. bisceptrum produces bulblets distinct from the parent bulb, somewhat after the fashion of Fritillaria pudica, each bulblet however close it may be to the parent bulb seems distinct, but the main bulb at times may divide by splitting and forming a new bulb on one side below, though this is very rare. But there are copious bulblets formed around the lower edge of the parent bulb, and which often are connected with it by runners an inch or more long, and these are white and with very thin and hyaline coats. Allium fimbriatum however rarely forms new bulbs, and then by buds pushed out from the outer and lower edge downward, but the bulb scales are conspicuously different, being very thick and opaque and red, and bulbs nearly globose while those of bisceptrum are inclined to be ovate. The leaves of fimbriatum are always single, while they are two or more in bisceptrum. The leaves of both species are thick and fleshy and triquetrous.

Jepson keeps up Allium campanulatum on the flimsiest of grounds. So far I have been unable to find any tenable characters, to distinguish it from bisceptrum.

Allium haematochiton Watson. Smiley in his Flora of the Sierra Nevada page 138 throws doubt on the accuracy of my statement that this species grows at Soda Springs (Jones, Allium P. 8). I have reexamined the specimens on which this statement is based, and am inclined to believe that Smiley is right, and that this species is found only in the Tropical life zone, and that my specimens belong to another species, A. validum?

Allium Piersonii Jepson is antedated by A. monticola Davidson Neither writer seems to ever have seen the specimens of this specie growing. It has been persistently referred to the falcifolitum group becaus of its great and hooked flat leaf, overtopping the stems. But the metho

of propagation is entirely different, and is that of A. bisceptrum, while the bulb coats rarely show the tortuous markings of bisceptrum.

Allium decipiens Jones is yet to be segregated from the bisceptrum group. There are two good bulbs in the type whose markings may keep the species up, but the general aspect of the plant is too near bisceptrum.

Allium amplectens Torr. Jepson confuses with A. serratum Watson, which is the same as A. peninsulare Lemmon. There is no mistaking Watson's description of A. serratum.

Allium acuminatum Hook. Jepson never seems to have noticed the peculiar markings of this species which can be instantly separated from all other species.

I am not in a position to criticise the species of Jepson, intactum, anserinum, and Modocense, never having seen the types. But their validity is doubtful.

Allium monticola Davidson. This onion which has been found growing on San Antonio peak by various botanists. I have had an opportunity to study growing in its native habitat, and can give more definite information about it. I am convinced that its place is near to A. bisceptrum and campanulatum, and not at all with the falcifolium group, for the following reasons. That group all propagate by division of the mother bulb by splitting down the center, as well as by the seeds. They all grow in clayey situations mostly on bare knolls where there is a water seep in the spring. The crests where they exist at all are low and thick and not lacerate and inclined to be central instead of on the angles. They all have the wide onion-like leaves which greatly surpass the inflorescence and are falcate. A monticola does not propagate by division but by filiform underground runners as does A. bisceptrum, on the ends of which is at least one bulblet. These runners vary in length from a millimeter in length to four inches. Very frquently we find bulblets coming out at the angle where the bottom and side of the mother bulb come together and pointing downward, at other times the bulblets are remote from the mother. The length of the runner seems to be a matter of convenience of location among the slide where the plant grows. The plants always grow in talus, or sliding shingle, never in clayey situations, and generally singly and not in bunches as the other. It also grows at or near timber line where the winters are severe, and not in the Middle Temperate or lower life zones as do the others. Then the bulb coat markings seem to resemble the Falcifolium group because of meshes except the rectangular ones of the thin coats. But the difference is greater in that A. monticola has several to many thin coats interspersed between thick and rather rigid coats which seem to be papillose-pubescent to such an extent as to obscure the markings if there are any. Once in a while I seem to faintly discern minute crinkly markings of the bisceptrum group, but as yet am not certain that there are any such markings.

Another species that seems little known is A. lacunosum. This has the habit of most onions, growing on bare knolls where there is water seep in the spring, where there is some clay. The fact that it has two

filiform leaves separates it from fimbriatum and acuminatum, both of which have the thick and rigid bulb coats intermixed with thin ones, but have the solid meshes which are so characteristic of acuminatum and whose walls are raised forming pits in the coat, and which are very minutely sinuous. But there is a difference in these markings. Those of acuminatum are triple, the meshes rounded or nearly round and deeply pitted, so that they can be seen by the naked eye. Those of fimbriatum are small and oblong, coarse walls apparently simple and little raised but hard to make out, while the crests are fimbriate and very long. Both these species have acuminate and very red flowers, fully half an inch long. Those of lacunosum, the meshes, are oblong, evidently pitted and walls with a sharp ridge in the middle. The pods have entire crests on the angles extending toward the center. The flowers are about half the size of the others and mostly white or with pink stripes along the middle and thin. There are other species with the same habit as the acuminatum group but the meshes are serrate as in serratum, peninsulare, etc. The color of the bulbs is almost always red as are those of A. fimbriatum.

Jepson in his Manual of the Flora of California adds a synonym for A. monticola in A. Piersonii, a needless synonym.

Allium serratum Watson. Jepson is again in error on page 220 of his Manual where he calls A. serratum A. peninsulare, and applies the name serratum to A. amplectens. A casual reference to the Botany of California pp. 148-9 and to Bot. King 487 t. 37 f. 4-5 shows conclusively that Watson's type of A. serratum was the long and acuminate flowered form which had been referred to A. acuminatum and which is plainly A. peninsulare of Lemmon. After the description Watson refers to A. amplectens as probably a young state, but in this he was in error. A amplectens of Torrey was well described by Kellogg, and this inappropriate name amplectens was discarded by Watson who adopted attenuifolium in its place, but strict priority requires the retention of amplectens. The plants of this group are at once identifiable by the inflated flowers and wide perianth, and seem to include A. Sanbornii which differs in having the thick bulb coats with innumerable fine vertical lines and minute vertically oblong meshes. A. Sanbornii may be only an aberrant form of the other, for at times the zigzag markings of amplectens may be wanting. One can see no reason for the absence of these markings, but it is a fact just the same.

Jepson proposes several new names for onions in his Manual, and of these I cannot speak at present except to say that it is quite unlikely that there can be so many undescribed species.

ALLIUM INYONIS

The bulbs are single, round, ovate, erect, ½ inch wide and an inch long, normally dark-purple, at least within, of thick and papillose and opaque scales alternating with thinner and papery ones which are also papillose and translucent, but showing no well defined meshes thoug

here are very faint lines running nearly vertically with slight waves in hem and with cross lines as if walls of the cells, which do not go directly across, but the general outline of these so-called cells is oblong. Toward the tips of some of the thinner scales there are very many small and oblong cells appearing quite regular and vertically-oblong. A. atrorubens on the contrary has thin bulb scales, all of them, and the meshes are well defined, and with relatively straight walls, and no tendency toward kinks. It is a common plant of north central Nevada to the Utah line, and normally the bulbs are nearly white, and flowers normally almost black-purple, and the bulbets are conspicuously elliptical and elongated, while those of Inyonis are either spherical or ovate and not elongated. The floral segments of Inyonis are linear-lanceolate and acuminate and about ½ inch long, and fully as long as the slender pedicels, white and with a purple strip down the center rib, erect and not spreading nor recurved. Crests central, linear and mostly entire and erect and from ½ mm. long, and slender. Bracts mostly 3. and broadly ovate-triangular. Flowers 20-30. Seeds black, angular and appearing papillose or cellular., and nearly 2 mm. long. No doubt this plant is an ally to A. fimbriatum, and not allied to atrorubens, as is shown by the peculiar bulb coats. It is still a problem to find well marked distinctions between Allium fimbriatum and cristatum. Allium fimbriatum seems to have the crests arise from the angles of the ovary and not the style, but the free parts or tips are close to the style. Our southern botanists are unable to separate A. Parishii from A. fimbriatum.

Allium fibrillum Jones. This appears to be common under coniferae west of Currie's Nevada on the mountains adjoining Ruby valley. The bulbs are elliptical, and split below or produce long underground root stocks bearing one or more bulblets, often having a small bulblet arise from the lower edge of the main bulb. The stems are filiform and with single filiform leaves 4-6 inches long and 1 mm. wide which generally curl toward the tip. The bulb-coats are yellowish, flaky and thin, appearing as if rugose. The stem has but one leaf, but there are others at the base, so that mature plants may seem to have two or more leaves.

Allium praecox Brandegee? Norco, on the northwest slope of hill, in the brush, in sandy gravel. March 20, 1929. Plants single mostly, apparently not propagating by division, about 1 1.5 feet high, erect and strict. Leaves lenticular in cross-section and often half an inch wide, soft flabby, erect and tapering to tip and a little shorter than the scape. Bulb depressed-globose, not over an inch wide, of very thin and gray scales with the markings of peninsulare. Flowers 10-15, normally white within, and on the outside purple-veined below, and usually with a rather broad stripe down the middle which fills the whole segment below. Segments firm but not rigid, oblong-ovate, acutish, opening so as to make the flower campanulate, about 6 mm. long, all entire, a half longer than the stamens. Crests conspicuous and spongy and toothed, rather wider than the ovary, purple and fully 1 mm. high. Bracts of the inflorescence

ovate-acuminate, about an inch l ıg, 2. Pedicels rather stout, 1 1.5 inches long and spreading. The onion of southern California are in a state of chaos. When my revision was printed I had not had a chance to study the California forms, and apparently did not clarify them properly. The bulb coat markings of this species would place it among the specialized group represented by A. bisceptrum, and in that case the roots should propagate by budding from the lower edge, or by offshoots ending in buiblets there. So far as I have seen there is nothing to indicate what is the method of propagation, but the species is a remarkably well defined one, and fully distinct from the flabby ones like attenuifolium. Then the leaf character is that of bisceptrum.

Allium Inyonis Jones. Abrams in his flora of the Pacific Coast p. 389 makes this the same as A. atrorubens Watson, in which he is mistaken. The relationship is closest to A. bisceptrum and fimbriatum. The flowers are not the lurid ones of A. atrorubens. I now have rather abundant material from near the type locality, just east of the "Summit" of Owen's valley. It has the habit of A. fimbriatum, growing in loose gravel on the edge of the juniper zone and on comparatively level benches at about 5000 feet alt. along with Cogswellia Parishi Crepis occidentalis, Cowania, Juniperus Utahensis, etc. The stems are about 4 inches high, and the thick and wide leaves are single and coiled at tip and flattened and glaucous and surpassing the stems a little. The stems are 2-4 mm. thick and erect and stout. The roots are about 4 inches below the surface.

Hesperocallis undulata. This desert lily abounds on sandy flats free from alkali in the Imperial valley. The stems shoot up straight for a foot or two at first, and then often but not always bend over and rest on the ground. The leaves are always flat on the ground and often three feet long. The stems go down about a foot in the sand and terminate in an ovate bulb heavily coated with coarse and fibrous sheaths. The bulbs of well developed plant are about 3 inches wide and six inches long and erect. The stems are very fragile and slender near the surface and break off readily, though higher up are often an inch thick. At flowering time there seem to be mostly a special set of roots to furnish moisture. These are about four inches long, half an inch thick and an inch wide, resembling a slice of citron prepared for eating. I have seen a dozen of these on one root, or bulb.

In Cont. Herb. 1 278, in describing Festuca Jonesii Vasey refer the type locality to southern Utah, but the plant was gathered in City Creek Canon, Salt Lake City, Utah.

Yucca brevifolia Eng. If one follows the hair-splitting of Trelease (and I do not) he would unhesitatingly put this species in the proposed genus Clistoyucca because of the peculiar perianth and the nauseating odor of the flowers. No other Yucca has such thickened petals at the tip nor the odor, but in all other rsepects it is a good Yucca. Y. valid

f Brandegee has much the same habit, and doubtless is a form of Y. ustralis, which belongs to th macrocarpa group with edible pods.

Yucca Whipplei Torrey. I fail to see any good reason for relegating his species to a separate genus. It is in every respect a good Yucca, and most magnificent one of them all. The typical form of the species was ot at San Pasqual, which is east of Escondido, California. I have visited hat locality and studied the plant there. Unfortunately the form there is ntermediate between the two most abundant forms in Caiifornia, both f which would ordinarily receive specific names. In order to keep these orms separate I propose the following names, based on habit:

Yucca Whipplei var. Parishii. n. var. Plants with biennial habit, hat is dying as soon as flowering and not stoloniferous. Leaves flat and idest in the middle, often an inch wide and 2 feet long, peduncles often 0 feet long and 4 inches thick, with a flower cluster 10 feet long in ddition. Pods erect, rather oblong. This is the common form at low elevations on the Pacific slope, seldom if ever found on the desert side. Y. graminifolia Wood is also an intermediate form which occurs at times on the lower hills.

Yucca Whipplei var. caespitosa n. var. Plants conspicuously caespitose with many crowns. Leaves triquetrous and long-linear, rarely over ¾ inch wide. Peduncles a few feet long, the flower cluster about as long, whole rarely 6 feet long. This is the common desert form and runs over the crest of the ridges at Cajon pass, extending from near Owen's valley southward into Mexico. The flowers of all the forms are normally white, but occasionally are purple-tinged. The species when in flower is alive with the little pronuba moths. This plant should be the state flower of California.

Yucca brevifolia Eng. Y. arborescens (Torr.) Trelease. This species shows a variation from all other Yuccas in the thickened petals and in the very disagreeable odor of the flowers. The flower cluster is a very dense ovate or oval mass a foot or two long and sessile among the leaves, and greenish-white in color. The heads bloom mostly in April at 3,000 to 4,000 feet altitude. The flowers are so congested that they appear erect and they never seem to open more than enough to let insects in. The bracts are small, white, and hyaline and do not show till the flowers fall. The outer perianth parts, 3, are broadly linear, fleshy and blunt and thickened at the tip to 2-4 mm. thick. The inner parts are elliptical and also thickened. The leaves are widest at base and very rigid and bluish, tapering to the very sharp tip. The trees are usually 15-20 feet high and sometimes 3 feet in diameter. The leaves fall off after a few years and leave swabs of them on the ends of the stems.

Yucca australis var. valida (Brandegee) Y. valida Brandegee. The status of this species is still in doubt. To all appearances it is only a form of Y. australis, growing in more desert places. It has very little relationship to Y. brevifolia, whose pods are not fleshy but dry and cartilaginous when ripe. It was my good fortune to get ripe pods of the common Yucca of the Cape region near Todos Santos, which is Y. australis and can be separated at once from Y. baccata by the flat, short,

and flexible leaves narrowed below and by the very slender and thread-like filaments on the margin, contrasting strikingly from the coarse threads of baccata. The pods are oblong and not pear-shaped and conspicuously fleshy pulpy with sweet and edible pulp nearly half an inch thick. The pods are pendent. The flower cluster is scarcely peduncled. Flowers not seen. The leaves of both species are bluish, and not apple-green as in Mohavensis. This tree has the same habit of growth as Y. brevifolia and often is 20-30 feet high.

CALOCHORTUS SPLENDENS X PLUMMERAE

At the Burn Devore California. May 20, 1928. Plants about 2 feet high, usually a half higher than C. splendens, and usually with strap-shaped root leaves as in Plummerae. Flowers vary from the size of splendens to a half larger, bright pink-purple as in splendens. Glands absent, replaced by a purple smooth spot. Lower half of petal long-white-hairy within, as in splendens, and not yellow as in Plummarae. The whole appearance of the plant is that of a robust C. splendens with strap-shaped leaves, but has onion-like leaves. At first this seemed a valid species, but further search showed intergrades with small glands. S. Plummerae comes into bloom just before C. splendens goes out, and grows in the same locality with C. splendens.

Washingtonia filifera. An examination of the flowers of this species in the probable type locality shows that the perianth is made up of two distinct sets of 3 each, the outer set being cordate or very broadly ovate, and barely 1 mm. long and erect. The inner set has triangular parts which are acute and closely reflexed, white. The stamens have another about 1 mm. long and linear and versatile, and brownish. The pistil seems abortive though present. No female flowers were found, and no fertile flowers either. This accords with my observations of the var. Sonorae, where the flowers are often dioecious or monoecious. But I have not seen fertile flowers so far.

Erythea edulis. The flowers of this species are greenish white. The outer perianth members are as in Washingtonia. The inner ones are erect, cordate to broadly ovate and rather cup-shaped, and about 2 mm. long in the fertile flowers. The stamens seem abortive though present, the anther being very small and oval, not ½ mm. long, but the plants fruit copiously without other staminate flowers being present.

Erythea armata. This plant is growing in the campus of the college is clearly polygamous. Inflorescence linear, long-peduncled, 4-6 feet long and drooping, with twice as slender branches as in E. edulis. Flowers sessile as in edulis, but whiter, 3 mm. long. Calyx forming a cup-like area, nearly round and not hyaline and pointless, 1 mm. long, felted-hairy. Corolla lobes spreading 2 mm. long, trangular-deftoid and acute, barely united below. Stamens 6 with the filaments united into a cup nearly to the tip and rhomboidal, and with the anthers more stalked than in edulis, and yellowish and elliptical, fragrant, about half as long as the corolla, which is 2 mm. long. Young fruit felted white-hairy. Flowers appar-

ently perfect, but in some trees the anthers seem aborted at least in part. Stigma nearly sessile. The flowers of edulis are much greener and more numerous, and are arranged in a uniform panicle, while those of armata are in an interrupted panicle, like a string of clusters of grapes.

Erythea Brandegei. In Zoe 5 189 Brandegee says of Erythea Brandegei that it "grows abundantly in the mountains of the Cape region." In this I think he is in error, having confused Washingtonia Sonorae with it. There is nothing to distinguish this species from Washintonia but the inflorescence, and Washingtonia sometimes has smooth and leafless trunks growing below, and occasionally even close to the growing leaves, and in the mountains the trunks are slender and would wave in the wind. I studied the palms in the Laguna mountains up to 3,500 feet altitude and saw no Erytheas, though Sonorae was common in the canons and on the slopes among the live oaks, and had the pink wood characteristic of Sonorae. These plants were in flower and had the conspicuous white sheaths and inflorescence of Sonorae. Also on the way to La Paz from Miraflores, near San Bartolo, palms are common along the way, and all seem to be Sonorae. I saw but one little Erythea near there. Purpus in his description speaks of the flowers being 2½ mm. long and solitary, which are like those of E. armata, and not at all like those of Sonorae, which are nearly 1 cm. long.

Eriogonum deserticola Watson P.A.A. 26 125. This plant, described as a possible annual, is a shrub 3-6 feet high, with much the habit of the taller specimens of microthecum. It is hoary when young, and the densely woolly leaves are rather thick and rounded-oblong. The panicle is very open and with racemose branches and scattered flowers. It is one of the hosts of Ammobroma, the other being Coldenia.

On the way up to the palms in December, 1928, I saw a few bushes of Condalia lycoides the hosts of the same Phoradendron as grows on Prosopis and Acacia.

On the sand dunes west of Yuma we hunted for Ammobroma and found many of the dead stems, and traced them down to the connection with their hosts. The plant seems to be only partially parasitic on Eriogonum deserticola and Coldenia. The stems die down completely to the host after blooming. How the tiny seeds get to the host 3-4 feet away after germination, and how they can produce such stems is a wonder.

Eriogonum exaltatum n. sp. Vergin bridge below Bunkerville, Nevada growing in loose sand along the roadside. Plants erect 2-3 ft. high, annual. Leaves rather leathery, and thick, round, entire or slightly angled, white-woolly, 1-3 inches wide, on rather stout and wingless petioles as long or a little longer than the blades, all basal and clustered. Stems several to many from the crown, green and glaucous, forking repeatedly and terminating in long compound raceme whose final rays are 2-3 inches long and with about six involucres on the upper side, spaced half an inch apart and erect, on pedicels shorter than the body which is

smooth, and turbinate and about 3 mm. long, not angled and with rounded and very short lobes. Flowers white with greenish or purplish midrib raised below, about 2 mm. long, 2-6 to the involucre, with segments ablong, and cordate below and not spreading, smooth, much resembling those of microthecum. Lowest involucre in the forks. This plant is about as high as E. giganteum and alatum but with the habit of deflexum but more strict. Bracts all minute and smooth and much shorter than the pedicels. In 1894 I called the attention of the U. S. Geog. board to the misspelling of the name Vergin in official papers. The Vergin river was named after a man by the name of Vergin who once lived in that region, but who is now dead. But this Board seems disposed to perpetuate the false spelling, referring the name to Virgin, the Latin name for girl, which has no significance in this case.

Eschscholtzia Californica is said by K. Brandegee to be perennial in Zoe 1 281, because she "examined the roots." But I have grown the plant for years and never found the roots to persist over two years. They give every appearance of being perennial, I will admit, but they are not.

Eschscholtzia Californica. Very much work has been done on this genus by various people, most of whom knew nothing about the growing of the plants. Mrs. Brandegee, who had the best first hand information, from growing them expressed her emphatic opinion that most of the so-called species were confluent and not good species. Greene, on the contrary, who knew nothing about growing the species, went wild in the creation of new names. My own experience in the field in the last 50 years has convinced me that Mrs. Brandegee was nearer rnght than the others. Some years ago I began to grow E. Californica for the purpose of determining experimentally some of these theories. In Utah this species is almost always annual, but seems sufficiently distinct from Mexicana and minutiflora if grown from seeds of the true Californica. In California where I have grown it for three years it is always a biennical blooming the first year, and generally the seed starts in the previous fall. I have studied many thousands of forms in California and never have found it survive over the second winter after blooming, and never have found anyone who has ever seen a perennial Eschscholtzia. The assumption of Watson in the Syn. Flora to the contrary shows that he did not know the species as it grew in California. There is a species of Eschscholtzia that is a shrub which I think came from one of the islands next to Lower California and which Greene named.

Stellaria and Alsine. So far as position is concerned Alsine comes first being (Linnaeus Sp. P1) on p. 272, while Stellaria is on p. 422. Kew Index holds that Alsine media is Spergularia media, but the description of Alsine media says "Petals bifid" and so Kew Index is in error, for the species on which the genus stands must be a Stellaria.

Drymaria. It is evident on studying this genus that those who have described species in it know little about it. My study seems to show the seeds to have good characters, as well as the sepals and habit.

Robinson in Syn. Fl. p. 253 says under one star "Cauline leaves rather broadly ovate" but he should have added "or wider".

Silene multinervia Watson is evidently like a pediceled form of S. Gallica. The seeds are the same, but ribs of calyx 15 to 20. It seems nearest to S. conoidea, but seeds quite different, and more ribs to calyx. It looks like a hybrid between Gallica and conoidea. S. concolor Greene is S. Pringlei Wat.

S. simulans Greene is S. laciniata Cav.

Ranunculus Austinae Greene and ellipticus are glaberrimus.

Ranunculus distributed by Harvard as O. D. Allen's No. 97, and called Suksdorfi, has sharp lobes but is otherwise good Eschscholtzii Elmer's No. "669" distributed as Suksdorfii is the same. Synonyms of Eschscholtzii are eximius Greene, alpeophilus Nelson, Helleri Rydberg. Saxicola Rydberg, ocreatus Greene, Utahensis Rydb.

R. pedatifidus is vicinalis Greene.

R. glaberrimus is calthaeflours Greene, inamoenus Greene, and Populago.

R. alismaefolius is unguiculatus Greene.

R. adoneus is stenolobus Greene.

R. occidentalis is Earliae.

In Cont. Nat. Herb. I 278 Vasey in describing Festuca Jonesii refers the type locality to southern Utah, but the type was got by me in City Creek Canon Salt Lake City.

Dendromecon Harfordii (Kellogg). This plant is apparently a good species, due to the elliptical leaves and the smaller flowers. It becomes at times a shrub 10 feet high and four inches in diameter, with candelabrum-like branches, and is more strict than the type species. It is frequent on Santa Cruz island among the oaks on moist slopes.

NOTES ON DRABA

In going over this genus critically, the first thing one notices is the usual splitting done by ignorant closet botanists whose chief activity seem to be that of matching pennies. The genus has now been mussed up by Greene, Rydberg, Wooton & Standley, Nelson, and Tidestrom, to say nothing of the conservative but too florid treatment by Robinson in the Synoptical Flora of North America.

Taking the generic segregates, we find Robinson recognizing Greene's Athysanus, and reducing his Heterodraba, a very inconsistent proceeding for Heterodraba and Athysanus are congenreic. But Robinson does not accept Erophila which stands only on the bifid petals. Jepson reduced Draba eurycarpa to Parrya, which is probably the right thing to do. Jepson also reduces my Draba unilateralis to Athysanus, which is the proper thing to do if that genus is to be upheld, but he should have recognized Heterodraba since that antedates Athysanus. Greene puts his Draba graminea in Draba but it is not a Draba evidently. Braya graminea (Greene). About the only character that seems to have any weight as separating Athysanus from Draba is the reflexed pedicels. The char-

acter of the pod is draboid and not thysanocarpoid. The flowers are those of Draba, the cuneifolia section, while the habit is also. Draba verna has a decided tendency to drooping pedicels (at the tip). There is no other Draba except the so-called S. reflexa of Greene, but that species is doubtless a form of the aurea group with widely spreading pedicels which occasionally are a trifle reflexed.

Taking the species of Draba there seems to be endless confusion by the over-emphasis by the splitters of trivial characters used by Robinson. Taking the little Drabas (Drabella) with white flowers Robinson holds D. Caroliniana distinct from cuneifolia on the shortened floral rachis, a trivial character certainly, but in the mountains of Utah this falls down. Taking up the cuneifolia forms Robinson keeps up the indefensible D. Sonorae on the absence of peduncle and on the stellate pubescence. But it is a well known fact that the pubescence of this whole group is stellate, but one of the branches of the hairs is often prolonged, and this leads him to speak of the pods being hispid instead of stellate. Robinson admits D. brachycarpa into our flora on the strength of a specimen of Howell's from Roseberg, Oregon, but this doubtless is a form of cuneiforia.

Taking up the yellow flowered forms of Drabella, Robinson does not seem to know that the type of D. Mogollonica is surely a perennial as is shown by cotypes in the Pomona herbarium from material sent me by Greene. Robinson puts D. asperella Greene in his flora because of the filaments being enlarged below, and puts a question mark against the species as doubting if it properly belongs in Draba, evidently not knowing that D. Mogollonica has the same kind of filaments, and doubtless other species also have them. So far as my material goes, and it is extensive, there can be no real line drawn between D. nemorosa and stenoloba and montana.

Taking up the aurea group we find more confusion, for there seems no real distinction between the styliferous pods and the others, and this is complicated by the Mogollonica forms which seem to run into this group.

Taking up the glacialis forms we find Tidestrom publishing a Draba uncialis Rydberg, when Rydberg never published such a species. Rydberg published a D. uncinalis, but not a D. uncialis. Tidestrom shows no critical study of the genus, be just follows the bell-wethers who preceded him. Wooton & Standley, and Rydberg, of course, split to the last hair. Rydberg shows in his last flora the legitimate result of such a course. His book has 1100 pages, where his former Flora of Colorado, covering nearly the same area has only 450 pages, and if he were to get out another edition later his pages would have to be expanded proportionally. Draba as understood in America forms a well-marked group, sufficiently distinct from allied genera either by habit or structure so as to be readily and easily understood. There is not the puzzling intergradation that confuses the student of the Caulanthus-Thelypodium groups, but the species are widely variable, and cannot be kept within the narrow limits proposed for them by present authors.

Robinson describes the flowers of Draba corrugata as pale-yellow, when the petals are white, the sepals and stamens yellow, the latter exserted, a very important character not found in any other Draba.

The Draba Mogollonica group. In the Torrey Bulletin 10 125, Bot. Gaz. 5 157, Torr. Bull. 26 623, Pittonia 4 17 and on, Watson Proc. Am. Acad. 23 25 257 we have the various opinions of Greene, Heller, and Watson, on this group. Greene with his usual spleen against new comers in systematic botany disposes of Heller as a bombastic upstart who spent his good money in going to the type localities of Fendler in New Mexico to collect duplicates of the hitherto unknown species of Fendler, and had the audacity to state that he collected duplicates of Fendler's Draba aurea var. stylosa in Fendler's type locality, not content with smirching Heller, Greene goes on to state some patent untruths in order to reinforce his claims that certain proposed species were distinct, as proposed by the infallible Greene. Heller in the Torr. Bull. 26 623 and on gives Greene a well deserved dressing down, and tries to show that the sheet containing the type of Draba aurea var. stylosa Fendler's No. 43 contains two new species and one new variety, which is going some, and which would seem to indicate that Fendler, one of the most acute of the old time collectors, was a slouch as a collector. Now it happens that I also collected near there in 1884, in the Sandias east of Albuquerque which are not far from Fendler's type locality, and in the same ecological area. My material collected on the 6th of September on the slopes among the deciduous oaks and shrubbery, corresponds well with Fendler's material as shown on his type sheet, and which both Greene and Heller try to separate into two species and one variety, on trivial characters. The presumption is that a collector of Fendler's ability would know whether the forms on that sheet represented varying forms of the same species, or were distinct. It sometimes happens that the best of collectors confuses species, but it does not often happen. My material shows conclusively that plants growing side by side, and presumably from the same seed are either simple or racemosely branched winter annuals with many leaves on the stems, which are either entire or conspicuously toothed. Plants a foot to a foot and half high, flowers light-yellow and large, and with stamens with filaments enlarged below. Pods broadly linear, oblique, twisted, about 1 cm. long, and a little longer than the slender pedicels. The style about 2 mm. long. There are simple stems in my material and stems racemosely branched from the base. The pods are somewhat hispid especially on the margins, but eventually would be smooth or nearly so, from the descriptions of Greene and Heller D. Helleleriana, D. patens, and D. Neomexicana are all form of the same species as is also D. asperella. The assumption of Greene that D. Helleriana is a subalpine species because of the locality in which it was got, which he assumed was in the high mountains was completely disproved by Heller. But it is a fact that forms of aurea with long styles are subalpine, and it is not possible to draw any line between aurea, streptocarpa and Mogollonica that will hold water. Greene's assumption that no forms of real aurea exist in this country still needs confirmation. Other synonyms are D. pinetorum, and spec-

tabilis, Greene. An extreme form which is subalpine is Baker's No. 58 from La Plata Co. Col. which has clasped stem leaves very broadly ovate and serrate, and perennial, and with filaments dilated downward Plants nearly smooth except for a minute puberulence and a few hairs. Watson is the only one who has called attention to the dilated filaments of D. asperella, but this character is not uncommon in the genus. Those of us who knew Greene most imtimately find it exceedingly difficult to treat his work with consideration since we are constantly coming up against his deliberate lies about well known things. With him anything went so long as he could make it stick, and as a bluffer he was a peach. He was a renegade clergyman , a sodomite socially, and a stench in the eyes of all decent people. The most charitable thing we could say of him was that he was insane.

Lyrocarpa Coulteri Hook. & Harv. Is ascribed to California on the type specimen, but never seems to have been collected since its discovery. It is common at Yaqui Well, 20 miles east of Julian. It is a shrubby based perennial, grows in the Tropical life zone, and now is found only in the bushes protected from stock which eat it greedily. It grows only on rocky slopes preferably southern exposures. The base of the stems is woody, as is the case with Stanleya pinnata, where it produces several branches racemosely. These straggle up, are slender and very brittle, reaching even three feet high, but normally are about 2 feet high, each branch terminates in a long raceme of brownish-purple flowers about I cm. long. The calyx is cylinderical and with the linear and concave sepals rather yellowish, and saccate below forming four conspicuous angles. The linear and concave petals have claws as long as the sepals. The blades are about as wide and spread at right angles to the sepals and twist over in one or two turns to the left forming a spiral but do not enlarge above. The color is a brownish-purple The stamens are straight, erect, and with long and linear anthers which about equal the sepals. The flat greenish pods vary greatly in length from twice as long as wide to four times as long as wide, sometimes being an inch and a half long. The plant grows on the slopes at the Well, but always protected by the brush, and usually only the long racemes project beyond the brush. It does not grow under mesquite or large brush where most of the annuals abound. I have seen it nowwhere else. In this vicinity the Agave desserti abounds, also Mammillaria phellosperma.

Examination of herbarium material shows that Orcutt collected this species probably at the same place, though it is credited to Borrego Spring, but it does not grow at the spring. But he must have gone past Yaqui Well to get to Borrego spring. An examination of the route of Coulter shows that in all probability Coulter went from Pala California along the old route to the Colorado river which went through Julian and down the slope to San Felipe, and then across the valley to Sentence canon and down it to Yaqui Well. From there to Borrego spring and thence probably to Kane spring following the present route to Yuma. In this case Yaqui Well must be the type locality of Lyrocarpa. What its range is north and south is still unknown.

Greggia. Robinson, Gray and Watson in the Syn. flora p. 102 No. 30 put Greggia along with the angular-podded genera such as Erysimum, Tropidocarpum, Sisymbrium, etc., in an anomalous group by itself, where it is entirely out of place. In the early years Gray evidently considered the plant to belong with Synthlipsis, Lyrocarpa and others with which it more readily groups itself. The soft and broad and stellate-pubescent leaves belong rather with the Dithyrea-Lyrocarpa group rather than with the Sisymbrium-Erysimum group with their pick-shaped hairs. The raised and rib-like septum in the middle of the greatly obcompressed pods is that of Lyrocarpa and Dithyrea.

Then the habitat is Tropical like that of the first two genera. The petals are aberrant in being so broad, though suggesting Lyrocarpa Xanti. In the Genera Syphanogamarum Torre and Harms follow the Synoptical Flora and add nothing new to the systematic position, putting Greggia next to Arabis and Erysimum, with which it is not at all related. That the pods are related to Synthlipsis is evident, and closely related too. An inspection of Gray's figure in Pl. Wright Tab. 1 p. 9 shows that Gray had never seen a ripe pod of the genus when he founded it. Whether Synthlipsis is generically distinct is another matter. It would appear to be from the character of the valves, which would place it nearer Lyrocarpa. Then the lobing of the stigmas is the same as in the Synthlipsis group, that is, lobes over the valves.

Robinson states, p. 142, that Watson's G. linearifolia cannot be maintained on the character of short styles and narrow leaves and therefore reduces it to Coulter's var. angustifolia. My material of Greggia got at El Paso, Texas has styles 3-6 mm. long. Those of the var. are almost none.

Greggia continued. The mature pods of Greggia are conspicuously obcompressed and flat, 2-3 mm. wide, with the septum conspicuously raised as a ridge ¼ mm. high, but the valves are entirely without any sign of a keel or wing on the margins, at any point, the tip of the pods being truncate to retuse, at both ends. Wooten & Standley p. 270, under Nerisyrenia, a substitute for Greene's Parrasia attempt to keep up the species on the leaves, and ignore the stigmas, but Robinson's material seems to vitiate this character. They also speak of the pods being "Quadrangular" a character that does not exist. Toward the tip some of the mature pods are bisulcate, but the angles of the valves are rounded always. It is curious that Robinson should give the type localities of both species as "S. W. Texas" which is very far from the truth. El Paso is the type locality for linearifolia, while both reputed species abound there, which is the extreme western side of Texas, and on the northwestern corner. My material gathered from El Paso south into Coahuila is copious, but does not show any transition between the two species.

Physaria. There is too much inclination among such botanists as Rydberg and Nelson to jump at conclusions in treating Physaria and Thlaspi. Physaria cannot be well understood without access to mature pods, and these are not always obtainable, oftimes the pods are subject to arrested development from lack of moisture in the air, just as is so

common with the Umbelliferae. No weight can be put on the comparative size of P. didymocarpa for this reason.

Arabis juniperina n. sp. Allied to A. Parishii. Seeds in 2 rows, broadly winged. Pods smooth, ascending, a little arched, 3 mm. wide and 1.5-2 inches long, triangular-acute, with stigmas almost sessile, nerved at least to the middle, and nerve raised below. Pedicels .5-1.5 cm. long, stout, and hairy. Perennials from a woody crown which is covered with very many, thick spatulate-oblanceolate and slender-petioled and entire leaves about an inch long, which are densely covered with felted, white, much branched hairs which are almost stellate. Pubescence on the stems gradually thinner toward the tip, but scattered on the pedicels, the leaves not auricled, linear and sessile, gradually reduced above. Stems several, branched below, often a foot long, erect, many flowered racemosely. Flowers purple, about 5 mm. long. This low altitude plant grows among the junipers at Cactus Flat along with Arabis arcuata and Holboellii on mesa, and blooms in spring. It has the habit of A. platysperma, but does not grow in that life zone, and is conspicuously pubescent. Cactus Flat is above Cushenbury Spring.

Dithyrea Griffithsii, Wooten & Standley. The authors of this name do not seem to know that D. Californica has the same character they applied to their species. They did not even know the really good character is in the short pedicels, which alone can keep Californica and Wislizeni separate.

Godetia latifolia A. Nelson and Kennedy is Clarkia rhomboidea. One would hardly expect persons with much botanical experience to make such blunders. Nelson wonders why other botanists have not taken up this species of theirs. May be this is the reason.

Braya graminea (Greene). Draba graminea Greene. Perhaps I should give more prominence to this change of name than I have given in references above. The cotype of this species is in the Pomona college herbarium from the collection of Baker, made at the head of the Grand Mesa, near Gunnison, Colorado. The plant is clearly a Braya and not a Draba, and grows at high elevation in the alpine region, and with the caespitose habit, and very low.

Crossomataceas. Recent studies of this genus and of Paeonia lead me to the opinion that the genus Crossosoma and Paeonia are closely related and belong to the same family. Bentham and Hooker put Crossosoma in the Dilleniaceae. Engler creates the family Crossosomataceae for Crossosoma, but leaves Paeonia in the Ranunculaceae. Gray treats the two genera better by putting them in a subfamily, Paeoniae, which though in the wrong family is the better treatment by far. There is a general similarity in the two genera that is unmistakable, and which allies the two genera to the Ranunculaceae closer than to the Rosaceae where Engler puts Crossosomataceae.

Paeonia. Robinson in the Synoptical Flora p. 56 speaks of the disk of this genus being "many-lobed". This is not true at least in Paeonia Brownii. The disk is flat and thin, and on the outer edge is the row

of stamens at least 1 mm. from the margin. Then comes a more or less double row of warty processes, mostly deltoid in outline, vertically grooved and acute, and almost as wide as long and thick, and often more or less united below, with solid interior and corky, and 3-4 mm. high, yellowish, sitting on the disk and not a part of the edge, as though they were abortive ovaries, then come the two to four follicles placed on the disk just as the warts are. These warts vary from 7 to 14, and are very conspicuous after flowering. The stamens have anthers that are quadrangular before anthesis. When they open the cells open along the middle, leaving a ridge, and lie flat, back to back, making the opened anther appear flat and very thin. Bailey does not mention these facts in his Encyclopedia of Horticulture, nor does Pflanzenfamilien figure the genus. These notes are from fresh material from Claremont, California growing in the wild.

Astragalus ervoides Hooker & Arnot. This species has always been an enigma, for it has never been collected since its discovery by Dr. Sinclair between San Blas and Tepic, western Mexico, and published in the Botany Beechey p. 417. It would seem that in Dalea B. L. Robinson, Bot. Gaz. 1898 p. 443 has done botanists a real service in laying the bugaboo Parosela which the Brittonians have set up to displace Dalea L. He shows that in the Species Plantarum p. 764 Linnaeus publishes Dalea as a synonym of Psoralea Daleae, citing Hort. Cliff, 363 t. 22 as the place of publication. This then becomes a proper publication of the genus Dalea, and which antedates Parosela Cavanilles, making the change of many names of Dalea wholly unnecessary, as was done by Vail,

Astragalus crotalarioides Bth. Ivan Johnston, who has examined the type of this species abroad informs me that it is surely A. limatus Sheldon. This then takes another puzzle out of the genus.

Astragalus oocarpus. Recent botanizing has extended the range of this very rare species. The type locality was surely near Julian, where it is still found. I also found it in 1926 on the Warner lake Cuayamaca drainage under pines. In 1927 I also found it on the Rincon grade two miles below Henshaw dam, and at Palomar hotel on the Palomar, where it is rather abundant. Normally it is about 4 feet high and erect among bushes, branching a little toward the tip, and with a very narrow outline, flower-bearing toward the tip in short racemes of ochroleucous and small flowers which do not bloom till about August, long after A. Douglasii is out of flower. In less shrubby places the stems straggle over the ground after the fashion of A. Douglasii, and the pods often are purple tinged as in that species, but smaller and somewhat stiffer, that is less papery. But it is evidently not far removed in relationship from that species, being truly of the Inflati. It is good to know that the species is in no danger of extermination.

It is rather amusing to see Jepson (Man. 573) making A. leucolobus a variety of A. inflexus, and A. Panamintensis a variety of A. atratus. He evidently has never seen a specimen of A. Panamintensis. He also makes A. limatus a variety of A. Preussii, which it is not. His A.

gnïnus is A. aridus, and is out of place.

Astragalus. Macbride Cont. Gray Herb. 65 pp. 28-29 (1922) tries to make a few new combinations in this genus. This was before the appearance of my monograph. A. lancearius Gray I at first confused with A. episcopus. Some years later I was fortunate enough to find it growing abundantly on the San Rafeal Swell, Utah, and was enabled to give a complete description of it for the first time. Macbride's treatment of A. tenellus is fair. In A. campestris he makes a blunder in putting A. diversïfolius as a variety of it while it is surely a form of A. junceus. He fails utterly to see the cosmopolitan character of A. campestris Macbride 27 and for this reason keeps up a number of form species, Garrettii, Carletonii, hylophilus, Rydbergii. He calls attention to Rydberg's ludicrous reduction of A. Coltoni Jones to A. episcoups. He attempts to keep up Gray's A. Gibbsii var, falciformis under Sheldon's substitute curvicarpus. But anyone familiar with the flora of western Nevada would not make any such blunder. A. Gibbsii occurs all over the region to the Dalles along the eastern base of the Sierras and eastward along the Columbia as far as Huntington. That there are intergrades abundant is evident. Macbride shows his ignorance by saying that A. Gibbsii grows only near the type locality. It is the opinion of the writer that Macbride is too wont to jump in where his information is not enough to float him.

Astragalus bicristatus. It never was my good fortune to study critically this species growing till this year (1924). That the plant belongs with the tetrapterus group is evident, but it simulates A. Casei very much in many ways. The cross-section is the same, an oblate-oval, and when fresh could easily be mistaken for that species, as there is no sign of the winged sutures then, but on drying the woody nature of the sutures makes them raised ridges or wings when the cellular pulp dries. The pods taper at both ends into long and acuminate beaks and stipes. The flowers are normally white, though often tinged with purple, while the flowers of Casei are decidedly purple. The habitat is the same, gravelly slopes in pine forests, and along with A. Douglasii, Lower Temperate life zone. The general habit is the same. Leaves about the same, plants growing in tufts.

Johnston in his treatment of Plagiobothrys Jonesii Gray makes altogether too much fuss over a casual remark of mine about its being an Amsinckia in all but certain characters. I had no intention of having my remark taken critically, it was intended simply to indicate superficial resemblance only. Just how much faith we are to place in the generic characters of Amsinckia I am not discussing, but I think too much is made of morpthology in systematic bontany, and the resulting hairsplitting gets us nowhere. To me the dimorphism in the barages is conspicuous everywhere, particularly of style of stamens, and to have anyone go and use this as a means of separating vegetable forms seems ridiculous. No one can actually say whether it is wrong or right till the plants are grown from seeds and the dimorphism actually proved. But the ecological disposition of the so-called species is very suspicious (ecologically).

Leonard in his revision of Scutellaria, p. 732, under S. antirrhinoides quotes specimens of mine from Prattville, Cal., "in 1879." I never was in Prattville till 1897, and only once then. So the reference is wrong. This doubtless is a clerical error, somewhat different from Payson' error in quoting a specimen of Thelypondium of mine from Mammoth Hot Springs Wyoming, a place that I never was in in my life. I collected often at Mammoth, Utah, 79 miles west of south from Salt Lake City, but the "Jones" he mentions must have been W. W. Jones, no relation of mine.

NOTES ON CULTIVATED COSMOS.

About 1920 I began to grow Double Cosmos for the purpose of creating a new strain. That year among several hundred plants I had two half-double ones and one with flowers all double and the internal ones as long as the outer ones. They bloomed so late that no mature seed was obtainable at Salt Lake before a heavy snowfall followed by a hard freeze killed all, the seed I did save did not grow.

In the spring of 1924 I bought of Fraser at Pasadena a packet of guaranteed seed, 90% pure double. Out of this I got about 10 half double ones and two all double ones which are now in full bloom. Oct. 16, 1924. Among these are certain sports with no rays at all, also proliferous heads which I will describe. The outer involucre has 8 linear-triangular bracts about ¾ inch long, united below into a flat disk 1 cm. wide. Just inside of this are 8 inner bracts which are not so green as the others, more hyaline, short-oblong and with triangular tip, and about 1 cm. long. These subtend the rays. The rays have stalks from 1 to 2 cm. long which are flattened a little toward the scales but are green and petiole-like. Some of these have two bracts near the base, others have knot-like projects a little below the flower as if rudiments of scales. There is no sign of ovary on the rays. At the top of the ray-petiole is the flat blade which does not differ from the normal one. From the base of this arises another similar short stalk about 6 cm. long which is green and bears a head of raylessflowers. Occasionally there is a ligule-like white bract corresponding to a corolla and 6 cm. long, but mostly there is nothing to represent the corolla. The heads mostly have less bracts but shaped alike. These doubtless will bear fruit. The disk floers are similar but stalks 2-5 cm. long, surmounted by a bell shaped corolla about 4 mm. long and white, this is subtended by 2 ligulate white bracts longer than the corolla. The stamens seem to be free and with rather long filaments. Then comes a head lihe the rays head but not oblately flattened as they are, and like them without rays.

Peucephyllum Schottii Gray. This poor shrub has been about as badly mishandled as anything could be. It was at first found by Schott in Sonora and the genus erected by Gray in the Mexican Boundary Rep. page 74. Then in his notes preliminary to the Synoptical Flora (Cont. 9 p. 206), he makes the egregious blunder of putting it in Psathyrotes, a genus to which it is not at all related. Then in the Syn. Fl. itself he

keeps it next to Psathyrotes. Then in 1897 I got the plant in the Death Valley region and after strenuous trying to get it identified at Harvard without results. I named it Inyonia dysodioides. A few years later that most acute botanist Mrs. Brandegee called my attention to its similarity to Peucephyllum Schottii. We then compared it and found it the same thing. I seem to have been the first person who ever studied it in the field and published the results,whichcleared up its relationship. To me the plant belonged nearest to Dysodia, but has the general habit of an Aplopappus, which after the fashion of Lepidospartum which to me is a good Tetradymia but with the habit of a Bigelovia. These anomalies in habit and structure weaken the already too badly strained classification of genera on physiological characters. There may be no better one in sight just now, but there should be one somewhere.

Venegasia carpesioides Gray. The involucre is distinctly Coreopsoid. There is an outer series of green bracts at the base of the head, and immediately above it a series of rather hyaline bracts in one whorl forming a kind of cup in which the flowers lie. The corolla tube is densely hairy with flattened and about six-celled white hairs spreading irregularly, and appearing as if glandular at tip. At the very base of the tube there is a ring of similar hairs closely reflexed as if a kind of pappus but not larger than the other hairs. The akenes are about 10-angled, and on the angles is a line of interrupted white cells as if the beginning of wings. These notes are taken fresh from material gathered by me on Santa Cruz islands, March, 1929.

This plant is not well characterized by Gray either in the Botany of California Vol. 1 p. 372, or in the Synoptical Flora Vol 1 pt. 2 p. 317. In addition some errors occur in the characters given. The general appearance of the plant is that of Silphium or Wycthia, but the texture of the leaves is soft and thin though the plants are a yard high, with the stems very leafy. Plants nearly smooth throughout and erect, branching above. The peduncles terminal and the flowers therefore single or cymose, and yellow even to the disk flowers and inclined to be overtopped by the leaves. The under side of the leaves has scattered over the surface and on the ribs rudimentary hairs which Gray erroneously calls "resinous atoms." He also calls the pubescence on the base of corolla tube "glandular-bearded," which it is not. The leaves are alternate, slender-petioled, ovate-acuminate, soft, almost smooth, palmately veined, 3-4 inches long and with ribs conspicuously raised below. Heads ¾ inch high, about 2 inches wide, on a peduncle about 3 inches long, which terminates in one to few lanceolate bracts close to the heads, which pass on the angles of the heads, into 1-3 broadly lanceolate spreading, and twisted or variously distorted and eared and acute bracts ¾ inch long, which are green and erect. Then next the flowers is a single series of close-pressed, erect,cordate-ovate and rounded bracts about 1 cm. long by ¾ cm. wide, which are conspicuously eared below, smooth, green but tending to become hyaline above. The heads are truncate below and sharply angled at the insertion of the outer bracts and 1 cm. wide. The

receptacle is about flat and favose with circular pits where the flowers arise. There is no chaff or other processes on the receptacle and for this reason the genus is thrown into the Helenieae rather than with the sunflowers. The flowers are 50-100 and closely packed. Rays 15-20 and in a single series, pistillate and fertile and nearly linear and about an inch long, 3-5-nerved, obtuse, concave, with lower part tubular and 3 mm. long and densely pubescent with short flat jointed and oblong spreading hairs ½ mm. long, the pubescence inclined to spread a little upward along the ray. Stigmas club-shaped and blunt. Akenes cylindrical, finely striate, about 4 mm long and 1 mm. thick, black, truncate at the tip and without pappus, with scattered atomiferous hairs. Disk flowers yellow, about 1 cm. long, with the same pubescence on tube and with the same akenes which are oblong. One would think that the pubescence is glandular but I fail to find any glands. This is from fresh material recently gathered near Santa Monica. The plants have the same habit as Silphium perfoliatum and grow among the brush in tufts along with Helianthus Californicus Rhus virens, and intergrifolius, Salvia mellifera, Stachys Californica, Platanus, etc. The flowers are much inclined to be in imperfect heads, and heads always surrounded by the leaves. This is a shrub 4-10 feet high.

Introduction to the Genus Haplopappus by Harvey M. Hall pp. 32. The most striking thing about this brochure is the assumption that the data there given are new to science. Even a cursory examination of the work of a score of systematic botanists from the time of Nuttall to the present should have given Hall the data to accord credit to men who worked in that line before Hall was born. Perhaps Hall has no intention of assuming to himself the credit for the principles he announces, but if he does not he should have referred them to men who used them long before he was a botanist. If on the other hand he does not intend to assume credit for them then why does he publish them at this late date? I myself have used them for over forty years in my study of the ecology of the Great Basin, in which I spent my life since 1878 One reason why we incline to question his motive in the matter is that he is under the direction of Clements, whose assumption of great superiority over others is chronic.

Leptosyne gigantea. It is hardly likely that this can be distinct from L. maritima. It abounds on Santa Cruz island hanging from the cliffs near the sea. At times it becomes ten feet high and with a trunk 4 inches thick, but not really woody, for the ax will cut like a knife through the whole trunk at a stroke, quite different from the trunk of Alvordia glomerata which is woody like the allied genera, such as Aplopappus. The branches of the trunk come out in a candelabrum-like way and are few, and with the big swabs of leaves on the ends, being leafless elsewhere. As to merging the genus in Coreopsis I incline to think it is not justified. So far as this species is concerned the corolla is peculiar not only in having the bulb at the base variously developed but in having the lower two thirds of the corolla green and finely striate and rigid, then

it terminates abruptly in a yellow and very thin tube 1-2 mm. long with the lobes on the end. The green part is conspicuously different from the rest. At the point of change there are a few gland-tipped hairs, 1-3 cells long. The seeds are 10-striate. The ray flowers show the same tendency of the base of the corolla. The seeds are without any pappus, or rudiments of any, flat, and with only rudimentary wings.

Tuckermannia maritima Nutt. Trans. Am. Phil. Soc. 7 363. This is the original name for Leptosyne maritima. The characters given for the flowers in the notes above I find are common in both species, and are generic if we adopt Tuckermannia. The floral character is not found in any species of Coreopsis or Leptosyne. In addition no other species of Leptosyne is perennial or shrubby if we put Coreocarpus as a separate genus as Blake does. To me Coreopsis as accepted by Gray is made up of too many and too diverse groups. Whether the other species of Leptosyne are rightfully put in Coreopsis is a question. They have the same floral character, which is a distinct cylindrical tube, a little firmer in texture than the corolla proper, and which ends mostly in a ring of hairs and the swelled upper part or true corolla which is strongly 5-nerved.

Tuckermannia gigantea (Leptosyne gigantea Kellogg Proc. Cal. Acad. 4 198). Whether this can be kept distinct from maritima is still a question. It is a well defined species and always a shrub so far as I have seen. The leaflets are filiform and elongated, mostly twice as long as those of maritima. Maritima never is a shrub so far as I can find.

THE PASSING BOTANISTS

The last few years have taken a heavy toll of the old botanists. It is less than 100 years since the real botanical work in the United States began. My own life has spanned over half of that period. When I was a boy the names of Nuttall, Fendler, Wislizenus, Parry, Bigelow, Thurber, Kellogg, Hall and Harbour, Torrey, Gray, Engelmann, Wm. Boott, Lesquereux, Bentham, Sir Joseph Hooker, Eaton were familiar to all botanists. Then came a host of government explorers connected with the transcontinental railroad surveys, James, Watson, Stansbury, Gunnison, Coulter, Brandegee, Wheeler, Rothrock, Porter, etc. The naming of their collections was done mostly by Gray, Engelmann, Boott, Eaton and Lesquereux.

Then in the seventies there began many private collectors in exploring the regions of the so-called wild west. Hall and Harbour and H. N. Patterson and Brandegee did Colorado. I began work in Colorado in 1878. Bessey's students did Nebraska. Kelsey did Montana near Helena, so did Rydburg. Leiberg worked in western Idaho, Cusick in Oregon, also Howell, Tweedy, and others. Greene in New Mexico, Lemmon in California. In the eighties I did Utah, Nevada, New Mexico, Arizona and western Texas and California.

It was during this time in the late seventies that John M. Coulter

started the Botanical Gazette, published at Crawfordsville, Indiana, which, with the Torrey Bulletin, was the main medium of publication. N. L. Britton was connected with the Bulletin, but W. R. Gerard was the responsible editor. Now the only men of the long list of workers in those days still living are Britton and myself. The rest have passed on. The last two to go were Rose and Coulter.

Coulter seems to have been the one who started the nefarious scheme of taking part of the credit for work he never did, and which went into disrepute with Scribner. Rose was his pupil, one of the best, and took up the Umbelliferae. Coulter's part in this publication was that of sitting once in a while with Rose while Rose explained the work he had done on the genera. Coulter's chief part in the deliberations was smoking rank cigars and stinking up the room with tobacco smoke. It was the same method which produced Coulter's Flora of Texas, but to date no one has ever claimed being the clerk who got it out. This was the way Coulter got his reputation for being a systematic botanist. As a teacher Coulter was a great success. No one but Bessey ever turned out so many good botanists as Coulter. As editor and maker of the Botanical Gazette Coulter deserved the greatest credit. He was first, last and all the time a physiological botanist and not a systematist.

MEXICO

My familiarity with Mexico began with a trip to Ensenada with Pringle, Parry and C. R. Orcutt, who went as driver, cook and camp roustabout, in April, 1882. We drove to Tia Juana hot spring, then through the Valley of Palms, and on over the low mountains by the inland route to Ensenada and back by the same route.

In the spring of 1892 I was sent on a geological expedition to Mexico, going by rail to El Paso, thence to Sierra Mojada, thence to Zacatecas, where I spent a month between there and Casualidad, which is some 40 miles or more to the east. Thence to Mexico City, where I did not botanize. Thence to Colima and Manzanillo on the Pacific coast by way of Guadalajara. From Guadalajara I went by stage to Zapotlan. Thence by saddle animals to Ferreria in the Tapalpa mountains and back, botanizing along the way. Thence by saddle on the camino real to Tonila on the southern slope of the volcano of Colima, thence to Pihuamo, a day's ride through the jungle to the south, and then back again to Tonila. Thence to Colima, which I made my headquarters for a month, going out into the adjoining mountains. Thence by the narrow gauge railroad to Manzanillo, where I stayed a few days and botanized. Thence I went back by rail to Gen. Martinas' ranch, at Armeria, where we took saddle horses out into the coffee plantation, and botanized a little. Thence back to Colima, where I took hired horses to take me to the top of the volcano of Colima, and then over and on to Guadalajara by way of Zapotlan, going back to Irapuato and Laredo, Texas, and then on to Iowa through Texas and Arkansas. I collected over 700 numbers of plants on this trip.

In the fall of 1903 I went to El Paso, and thence by rail to Colonia Dublan, which at that time was the end of the railroad. Thence by stage to Colonia Juarez, where I hired a wagon and drove overland to Chuichupa in the Sierra Madres, botanizing on the way, and there and in Guayanopa Canon on the western slope. I spent about a month in that region. The botanical report on this trip was my Contribution to Western Botany No. 14.

During the Christmas holidays in 1923, 1924, 1925 and 1927 I took auto trips to San Quentin bay, botanizing on the way, but in 1927 I did not go below Miss Hamilton's ranch, 22 miles north of San Quentin.

I distributed sets of my 1882 and 1893 plants. I have sent out no other Mexican sets since then till the ones referred to in this publication below. There were Nos. 22292 to 22834 inclusive in the collection of 1926. There were Nos. 22835 to 23567 in the 1927 collection, and Nos. 24001 to 24659 in the 1928 collection. The smaller number of species in the 1928 collection was due to my collecting some 25 specimens of a kind in that year, and therefore of making many more sets than I am accustomed to do. There were 183 numbers in the 1928 sets, 124 numbers in

the 1927 sets, and 275 in the 1926 sets. That is the first set in each year contained that number of specimens.

The first requisite in the study of a region is a good map. The Hydrographic Survey of the Government has a good coast line map. This map was copied by Brandegee and by Goldmann in their reports on Lower California, but no attempt was made to put in mountains or settlements not visited by them. A few years ago the National Geographic society put out a pretentious one, claiming that it was accurate, but it is a farce, the mountains have been sketched in by the map maker wihtout regard to fact. Therefore a person going to that region has to make the first trip blind. I have been down the entire coast on both sides except the region north of Santa Rosalia.

After a week's rest I began sorting out and labeling my collection, which took me till June. Then I bundled a complete set of all my plants into an auto and struck out for Berkeley to compare my material with that of the Brandegee herbarium there.

I spent five very busy weeks at Berkeley till I had determined the names of most of my species except the new ones. Then a return to Claremont and a systematic study of all the literature followed, which consumed the rest of the year. I had already spent much of three years in making out a complete list of all the plants known to exist in the entire region. The results of all this work are embodied in this report. custom officials did not bother me nor ask any questions, nor did the steamer officers list my baggage as freight, as I had feared they would. The Americans on board, when they saw how well I got along, warned me that it would be different when I got to San Pedro. Well, at San Pedro I showed my papers and the inspectors passed me without question.

BOTANISTS IN MEXICO

The first botanizing of any moment was done about 100 years ago by men from British steamships that visited the coast. The expedition of Captain Beechy visited San Blas Nayarit (then called Tepic) and went as far inland as the city of Tepic, botanizing along the way. Mr. Lay was the botanist. His collection was reported on by Hooker and Arnot. Zantus was another botanist who spent considerable time at San Jose del Cabo about the same period, and at Santa Magdalena Bay. This report was by Bentham, called botany of the Sulphur. Not long after this Hartweg made large collections in Chihuahua and his plants were described in Plantae Hartweigianae. Dr. Coulter made a trip along our southern border a little later. Then the Mexican Boundary Survey in the fifties made a fine collection of specimens along our southern border and these were described in that report. About the same time Wright and Wislizenus made collections in northern Mexico. Also Thurber. These were described by Gray and Torrey. Various expeditions or visits were made by Californians along the Coast of Lower California by men more or less connected with the great gold rush in the late forties and fifties, and these specimens

found their way into the hands of Dr. Kellogg of San Francisco, who published them. Of late years Greene, Dr. Palmer, Orcutt, myself, Pringle, Purpus, Brandegee and various Government men have made extensive collections in Mexico, and the literature embodying the botanical results is rather extensive. By far the best botanist who ever worked in Mexico was Brandegee. Then came Pringle, a prince of collectors, who made the finest specimens, but whose work as an explorer was much inferior to that of Brandegee. Palmer's specimens were a disgrace to any botanist. Recently Standley has attempted to get together in a brochure on the Shrubs and Trees of Mexico all the scattered literature, and as a compilation is good. But the great mass of herbaceous plants is yet to be worked up.

To give even a list of the many men who have collected the flora of Mexico would be out of the question here, for I am interested only in the northern flora, that bordering on our southern limits.

Geologically the peninsula is an upthrust caused by pressure from the east, which caused a faulting of the formation from the San Jacinto range, California, to La Paz, Lower California, as is shown by the sharp escarpment rising abruptly out of the Gulf, in the form of interrupted precipices forming the san Pedro Martir range, which extends from Alamo nearly to Muleje, and then again rises into the long Sierra Giganta which extends some distance south of Loreto. This escarpment forms the backbone of the peninsula, and is triangular in cross section, with the western section sloping more gently toward the sea, and the crest reaching 8,000 feet altitude on the park-like summit of the San Pedro Martirs and 6,000 feet altitude in the Sierra Giganta. Toward the sea at the north there has been some crumpling of the sedimentaries into lower ranges parallel to the crests, and forming valleys between, but these valleys have been variously cut up by volcanic outbursts and flows, which become less frequent as you go south in the interior, and at length are entirely absent from Loreto to La Paz, leaving a vast plain rarely elevated over 1,000 feet above the sea. On the immediate sea coast on the west from north of San Quentin bay to the Cape other crumpling has thrown up low volcanic ranges of uplifted strata some of which form islands in the sea, such as Coronado, San Benito, Guadalupe, Cedros, Natividad, Santa Magdalena and Margarita islands, or scattered coast ranges of hills. The peculiar situation geographically, due to the lack of impinging currents and the air stagnation, has made the region south of the San Pedro Martirs very arid, and in consequence there has been a special adaptation of plants that has produced strange vegetable forms. The most peculiar being Idria columnaris, an adaptation of Fouquieria. Yucca valida, a form of Y. australis, certain Cactaceae, Veatchia Kelloggii, Ipomoea Jicama, and a few other species and genera with special features. This arid condition has led Brandegee and Goldman and Grinnell to a false conclusion as to life zones. They assuming the upper limits of the Tropical life zone as ending south of San Pedro Martirs, a conclusion wholly variant from the facts. The whole region examined by

me, from Nogales to Tepic, and from Santa Rosalia to the Cape, is all Tropical, except the tips of the San Pedro Martirs, which reach the Lower Temperate, and possibly the tips of the Laguna mountains. In very few places is the region of the live oaks reached, and this is still Tropical.

Along the escarpment on the western side of the Gulf, where the movement was greatest, certain blocks of sedimentary material have been lifted into islands, or volcanic outbursts adjacent have made islands, such as Ceralbo, Carmen, etc.

South of La Paz earth movements, caused by several pressure lines, have thrown up jumbled strata, forming a very rugged granite triangular area along the eastern coast, and which has in it various volcanic intrusions formed deposits of precious metals, and which rise to 3,000 to 4,000 feet altitude. This area is east and northeast of Triunfo (44 miles south of La Paz), and is very inaccessible. West and southwest of Triunfo the plains region south and west of La Paz gives way to the great Laguna range, whose eastern face is very precipitous, and runs nearly north and south some 75 miles to San Jose del Cabo, where it drops suddenly into the plain which borders the sea. The western side of this range is a great whaleback and less rugged though almost as steep, and is cut by box-like canons running down from its summit, and the base is about 20 miles east of Todos Santos. The Laguna range is crumpled by north and south forces into nine parallel ranges almost as high as the main range and about 10 miles long and which extend from the crest to the eastward like the flange of the letter L, though nine of them instead of one. They are very close together and form deep canons between and which are almost inaccessible. The altitude of the range is about 6,500 feet, and the upper half is covered with live oak and pine forests. There seem to be very few trails up the mountains for the reason that they have been utilized only as pastures for stock. One very difficult trail goes from Miraflores to a former lakelet or marsh called Laguna, and which gave the name to the range. The mountains have been visited by Brandegee and Goldman, but not at all thoroughly explored. Whether there is any Lower Temperate flora on the mountains is yet to be determined. So far as my examination went, the live oaks which abound on the upper stretches of the Tropical should give way to some Lower Temperate areas higher up. There are two classes of live oaks there, the true white oaks and the black oaks, but all are evergreen. This area has many open spaces with grass, and other herbaceous flora. Here and there grow Washingtonias among the oaks on the slopes, but usually they grow along water courses. It is in this region where the Erythea Brandegei grows, and which Brandegee says is very common there, but all the palms I saw were Washingtonias.

Brandegee speaks of the excessive rains in this region in the fall and of the mosquitoes. But there were none there on my visit, and sleeping in the open was as comfortable as elsewhere in California. Goldman speaks of the great fear of the natives for the striped skunk, of which I heard nothing on my visit. We saw a cougar and a large rattlesnake,

and a few birds. They say deer are common. I also saw a blue racer about 10 feet long with highly colored coat. Large animals are scarce, but there are many small lizards.

NONTECHNICAL DISCUSSIONS OF TRIPS
FLORA OF THE GULF REGION

In the fall of 1926 certain parties approached Prof. Munz of Pomona College to undertake a study of the flora of Lower California. Since his time was taken up by class-room routine he could not do the work. I was then asked to do it, for the reason that I was the only one available. My interests in the region lie wholly in a study of the border region from Texas west to the sea. After looking the field over I saw that the exigencies of travel would require my going down from Nogales to Guaymas, and thence down to Santa Rosalia, Muleje, Loreto, and La Paz, and thence to Cape St. Lucas. From there the Pacific coast regions, Margarita and Magdalena, Cedros, San Benito, and Guadalupe islands could be reached by boat. In case it proved desirable to examine the east coast of the Gulf this could be done either by rail from Guaymas or Mazatlan. I therefore decided to make a preliminary trip and look over the situation to see if I would get in touch with enough flora of the border to make it worth while to me to explore it , and if necessary to do the flora of the Gulf region on both sides.

About the 20th of October I left Claremont and landed at Nogales, where I found that on October 10th a terrific rainfall of about 10 inches had swept the region from Magdalena to Guaymas and southward over the vast plain for hundreds of miles, inundating the whole region, tearing out all railroad bridges, and piling up the track in hairpins on the bushes. The devastation must have been terrible.

I could not get a train for three days, and then only a work-train for Queribabi, which was the end of the repaired section. From there I was told I would have to depend on autos to get across the gap of 44 miles to Carbo, where another train would take us up for Hermosillo, and that it was doubtful if I could get through with my baggage. So I spent three strenuous days botanizing at Nogales. Then an engine hauling two passenger cars, several freight cars fitted with board seats, and other cars loaded with timbers and rails, pulled out, crawling along at ten to fifteen miles an hour, and in an hour reached the summit, some 4,000 feet altitude, in a rolling country, all grassed over, and looking orchard-like with the many live oaks. Then we slipped down along a gentle slope, and through a box canon to the ancient city of Magdalena. Then soon left the hills and out on the plain which was covered with brush about ten feet high as far as the eye could reach. Here and there a ranch house relieved the monotony, but these were often squashed down in the last rain. Most of the houses in the region are made of sundried brick, and if for any reason they are not protected by an overhanging roof, the rain soaks the bricks up and they squash down like mush. After many miles of trundling along the improvised roadbed we reached Queribabi, where

we were dumped out in the brush. This place was a station and a water tank. All sorts of autos were waiting in the brush, and every one seemed to be engaged to carry passengers who had booked ahead, but I finally found a Ford truck that was not engaged, and the driver, a boy, agreed to carry me to Carbo for 20 pesos. The car was like most Mexican cars, in the last stages of decomposition, but it would run. So we were soon off, flying along at the rate o f 25 miles an hour over a 10 mile an hour road, rattling, pitching, jolting and slipping along, the devil knew how, but hitting the high places and all the mud holes, and diving nearly straight down into new washes 10 feet deep, and out of them by the skin of our teeth, but always getting there, as Fords do. And so by night we drove up to another rambling railroad town, Carbo, in the brush by the side of what once was a raging river, but now a great sand stretch, where the round house was hanging by one corner where the flood had left it. There was a sea of faces, men, women and children, and dogs. There had been a string of houses facing the track, but half of them had squashed down in the last rain, and the people had set up some poles and made a temopary roof of brush, which would protect them from the sun. My baggage was piled in the waiting room of the station among the babies and dogs, and I elbowed my way through the throng to get something to eat. Most of the people slept anywhere where they could get room to lie down in the brush, and they would put a tin can on a fire and make some vile coffee and cook sometortillas and call it a meal. The men worked on the repair gang mostly, or gambled for a living, and they had their women along, and wherever they had put up a shelter that was home. I soon found that there was no cafe nor hotel there, but was told a woman was making coffee and tortillas near by. So I went over there and asked for something to eat and she said "Quien sabe." Then I made a motion of eating and she said "Si," and soon brought out some vile coffee and no milk, some chili, and tortillas, and charged me veinte cinco centavos. Then I sought a place to sleep. I found that at a ranch, half a mile off, I could get a cot for a peso, and so I posted over there. Returning the next morning I struck off across the wash to botanize for an hour. Then when I reached the station house I found my grip had been stolen. I hunted up the station agent and made a roar about it and got him to start with me for the jefe politico. Just then two Mexicans came up with my valise and said they had found it out in the brush, rifled, and my things scattered over the ground. So I paid each of them a peso and took the grip and jumped onthe outgoing train for Hermosillo. On the train I opened the grip and found it had not been opened. So the men worked a cute little graft on me and I fell for it.

All the way down the plain were the remains of fallen Mexican houses wherever we passed a ranch. Everywhere was devastation, washouts, railroad rails hung up on the bushes where the flood had left them, and the brush bent over, and the soil gutted out. There were no forests anywhere, but brush everywhere, 10 to 20 feet high, and almost every bush with sharp thorns that tore the flesh and clothing. We rattled and jolted along at 15 miles an hour till we reached the first station out of

Hermosillo, Ortiz, which was a military camp. There we switched three cars of soldiers on the train to protect us from the Yaquis. The soldiers looked like country boys in their bare feet, with white pants, a shirt, and sombrero, and a gun and cartridge belt and machete. About all they can do is to swagger around. The Indians say they can't shoot. They seem to have a deadly fear of the Yaquis.

Then we rolled on to the beautiful Hermosillo, the capital of the State of Sonora, a city of 10,000 people, situated on a rise on the flanks of a marble mountain that drops down to the Magdalena river. There are extensive ranches here, with sugar cane, corn fields, orchards and oranges, dates, and fruit trees. Cultivation is slovenly as usual, and devil grass is everywhere. The mountain is a conical uplift, perhaps 2,000 feet high, and covered with brush, and many interesting plants. Practically a week was spent on this mountain before I had collected all its species. Then an opportunity to visit a mine, some 20 miles out toward the Yaqui region, and in the Yaqui country, came and I rode out there and saw for the first time the beautiful Lysiloma candida with its waving wands of foliage.

At Hermosillo I lost my botanical note-book and all my papers, passport, etc. Believing that they had been stolen from my room while I was at lunch, I went to the Secretary of State, reported my loss and asked for a new passport. He replied that if I would get some one to identify me he would issue a paper that would do for the state of Sonora, but that I would have to get others if I visited other states, when I got there. I had taken a letter of introduction from Claremont to the Congregational minister at Hermosillo. So I appealed to him to introduce me to the Secretary, whom he personally knew. So we went to the office to fix things up and the Secretary refused to take the minister's identification. I knew that all the clergy were *personae non gratae* to Mexican officials, and that the white ministers had been expelled from the republic, but it never occurred to me that this would make any difference in my case, but it did. There was but one other man in the city whom I knew, a German mining engineer, whom I had met for the first time at Carbo. So I went to him and told my story. He replied, "Sure, I will go and lie for you." Well I did not ask him to lie for me, but this was his way of putting it. He was a state court expert, and had a standing in the state. So the next day we went to the office of the Secretary of tSate, and he went in and told the Secretary that he had known me all his life, and that I was all right. So I got my paper. About two weeks after that the President of Pomona college got a letter and package from the Baptist minister at Hermosillo, who wrote that he was out on the mountain walking for exercise and found my papers scattered around onthe ground, and because he did not know where I was, he decided to send them to the college. Later on it appeared that he had heard of my being in the city through the Congregational minister, Rev. Elias. The receipt of the letter caused some consternation at the college for fear that I had been murdered. A few days afterward a letter from me to Prof. Munz came in which I narrated the loss of my papers, supposedly by theft, but actu-

ally they had fallen out of my pocket as I went through the brush.

From Hermosillo I took the train for Guaymas, some 70 miles off. We were escorted by the usual guard of three car loads of soldiers. Guaymas is a fine city on a landlocked bay, which is large enough for a great naval base, and is surrounded by volcanic hills at least 2,000 feet high. Since my object was to get over on to the peninsula as soon as possible, my stay was governed by the time the next steamer went to Santa Rosalia, which was the next week. This gave me a few days to collect in this rich botanical region, and which had been visited by many botanists before my time and therefore was the type locality for many new species.

A peculiarity of all Mexican ports is the stevedores, a guild of loafers, who insist that all steamers shall load and unload by boat even if there is a wharf to which they can tie up. So after I had bought my ticket I could not go on the boat while it was at the wharf, but had to wait till it got in the stream and then hire a boatman to take me and my baggage to the boat. The boat was the Dorado, a tub of an affair, that as soon as it got into the open sea pitched and rolled and shipped water beautifully, an ideal seasick concern. Then there was no stateroom or bunk, and you had to roll up in your blankets and sleep on the deck or sit up on the benches. Then there was no eating system, but you took what the crew got or went without, and what the crew got was a mulligan made out of potatoes, strong onions, carrots or the like and squares of jerked beef, so hard that you had to eat with a sledge hammer; then there were tortillas, frijoles, and vile coffee made out of burnt coffee, and no milk. This was the menu three times a day, and every day. If there was any mulligan left over I suppose it was warmed up the next day. It was a treat one day to have some dates spill out of a sack, and have them passed around by way of dessert. Then an added pleasure (?) was the water that the boat shipped every now and then when a particularly obstreperous wave insisted in coming over. Then the floor was awash with four inches of water. The next morning we reached Santa Rosalia, a copper mining camp and smelter, presided over by Frenchmen who could not talk English. We stayed here all day, and I took advantage of the time to go ashore and botanize. There is no hurry among the Mexicans, and if there is no cargo to unload or load they loaf just the same, probably to let the machinery rest after the strenuous trip across the Gulf. As night began to fall we slipped out of the artificial harbor and rolled on our way to Muleje. Arriving there the next morning we rounded a rocky point and into a tiny bay, which was what was left of a little stream that flowed out of Conception Bay and on which the town of Mueje was located, a few miles above and out of sight of the boat. Here we also loafed all day. Then at night we pulled anchor and were soon rolling along in the open sea. The next morning we reached the offing, a steep and sandy beach where long log boats are the only means of getting ashore, and where they land for the city of Loreto, which lies back a mile or so among the cocoanut palms and dates and sugar cane. This used to be the capitol of the state of Lower California, but it proved to be more

convenient to split the peinsula in two and make one capitol at Ensenada, and the other at La Paz. There being some 800 miles between. Here we stayed all the rest of the day, loading oyster shells and dates, many tons of them. The dates were pressed into a solid mass in coarse gunny sacks, whose ends were securely sewed together. the whole wighing over 100 pounds. It should be noted that this is the pearl oyster region. It was interesting to see how they launched these crude dugouts. The boats were 20 to 30 feet long and 3 to 4 feet wide and high, and usually manned by four men with paddles. When we arrived about a dozen men would arrange themselves six on a side of a boat. Then they would pass a pole through some rope loops across the boat and put the pole ends on their shoulders and straighten up and so lift the boat off the ground, then march down the beach and into the water, pull the poles out and shove off between the breakers. If it was done just right, no water was shipped, if not they got a ducking. The men wore overalls and went barefoot, but had on sombreros, otherwise naked. When a boat landed there were enough men ready to shove each boat far up on the sand as the breaker bore it in. But the man in the stern usually got a wetting, but that was only a part of the game. They would soon dry off. The Sierra Giganta rises high back a few miles from the plain on which Loreto stands, and doubtless furnishes the water to support the town.

By night we had loaded all the stuff and were off again over a smooth sea, crossing the great fish-hook bay that extends from Loreto to La Paz. The next day we passed the great island Espiritu Santo on our left and reached the headland that runs out many miles from La Paz to the east. Why we did not go straight to La Paz instead of a long detour to the east soon became evident as we hugged the eastern shore, which was the only place where enough water existed to float a ship.

We could dimly see the great shoals and flats and sand dunes covered with the Mangle (Rhizophorus Mangle), a tangled shrub as high as one's head which puts out knees, deflexed branches which root at the ends, and forms an almost impenetrable barrier. This would make ideal hiding places for alligators and snakes if these were any on the peninsula, but there are none, though they are plentiful on the mainland almost as far north as Guaymas. The presence of buoys marking the narrow channel close to shore, where all the steamers sailed to the westward to get to La Paz, was unique to us, since the shallows did not show on the surface. After a few miles we came to a lighthouse on a point which we rounded and dropped anchor in Chiquilingue bay and took on some salt freight. This is a little landlocked bay and the only safe anchorage in northwest storms. Soon we were off again for some ten miles and passed in view of La Paz, the largest city of Lower California, which is located on the bluff that rises abruptly some 50 feet out of the sea. There is an anchorage some two miles wide here before the great sandspit is met which forms the barrier of the La Paz harbor. There is a modern pier here but the boat anchors out in the water and is soon surrounded by dugouts, all soliciting passengers. These boats are mostly such as we saw at Loreto. This was the end of my sea journey and so I dumped my baggage in a

boat and struck out for the Palacio hotel, without first barganing with the owner for my passage. After half a mile of rowing we came opposite the hotel and landed and the men shouldered my baggage and struck off for the hotel. Arriving, the landlady, Mrs. Meyer, a widow, who was educated in Los Angeles, but a native Mexican, cordially received me and spoke good English. The boatman stuck me for 5 pesos for carrying my baggage to the hotel, which was more than two prices for the work. La Paz is an ideal town, like Mazatlan, for a honeymoon, so dreamy and calm and quiet along the water front. Here all day long the pelicans sweep along the surface and plunk down sharply into the sea when they see a fish, going down with a splash, struggling a moment with the fish and then elevating their heads and letting it slump down their throats. Then a swallow and another flight, hour after hour. Once in a while a gull will shoot down on the pelican and rob it of its prey. Occasionally we see porposises slipping in and out of the water like greased pigs, in single file, apparently just doing it for the fun of it. Many fishing boats lie here, as well as pearl fishers, for this is the center of the pearl traffic. This is a regular port of call for the largest ocean steamers. Almost every day sail boats come in loaded down to the water's edge with sacks of tanbark, Lysiloma candida, for the great tannery here. Just now this is the only business except pearl fishing that keeps this city of 10,000 alive. There is no water or streams anywhere in this region. All the water is raised by wells and by wind mills imported from the U. S. It is very hot and dry here. Cocoanuts and palms adorn the town and the beach. The houses are all the usual Mexican style and the streets are unpaved except in the main business part, where there is some brick paving, and along the wharf. There are two roads going out from here. One goes 125 miles to Cape St. Lucas to the south, and the other goes to Todos Santos and Pesquidero, 60 miles to the westward, on the Pacific side. This road also branches and goes to Santa Magdalena Bay, about 125 miles off. The road is an ordinary country road for wheeled vehicles, and safe at 10 miles an hour with autos.

I was much interested in the flora here, all so different from what I had seen before. I spent a week or two, getting most everything that was available. Then a steamer happened along, the Washington, a Mexican Lines boat, bound for Mazatlan. This was a very unusual occurrence for a boat to go to Mazatlan instead of the Cape. But as I was getting to the end of my purse I decided to take it and spend a few days there and then strike out for home. La Paz lies on bench land adjoining the sea, but to the south and east hills arise a thousand feet or more high, having quite an interesting flora. Beyond the city there is a succession of higher hills that at last become quite high mountains, but I did not get to them. The shore to the east was a very fertile region for me.

Mazatlan is the most beautiful city in western Mexico and also the largest. It has a natural harbor of some size but is all silted up by a big river which comes in from the east, and no attempt has been made to dredge it out. There is a rambling wharf and custom house where launches land from the boats, and where lighters are drawn up. There is

a fine lighthouse on an adjacent island and a radio station. There is a crescent beach of great beauty facing the sea, a fine promenade made of cement which extends to the business houses and hotels. One could sit all day along this beach and dream as he listened to the roar of the surf, at his feet. At some distant day in the past crude forts were built to protect the city from assault from the sea, and there are still some old smoothbore guns rusting on their ancient carriages, but the fortifications are falling into decay, the best argument for the pacific disposition of the U. S. Beautiful paved roads have been cut along the beach and around the hills for scenic purposes, and one loves to stroll along them in the evening. Mazatlan lies between rather lofty and steep hills, densely clad with tall brush. It is a very stately city with many fine old buildings, and paved streets. Three days were spent here in strenuous botanizing Then the long trek for home. As you roll along over the plain northward you find the brush is taller, some 20 feet high, and often large trees appear scattered in it, but no real forest. Along the rivers are large areas of bamboo-like grass, 10 to 15 feet high, and occasionally forests of cottonwoods (populus dimorpha). The rivers are about 100 yards wide and full of water. No roads appear anywhere except in the immediate vicinity of towns. There is still little grass.

Going north from Mazatlan the vegetation continued much the same to Culiacan, and the country was much the same, brush everywhere, with an occasional clearing and a ranch or small town. From Culiacan north there was some reduction in the highth of the brush, but the cactus became more evident, consisting chiefly of Cereus Pringlei and Thurberi. There were many square miles punctured thickly with these cacti. Night brought us at Culiacan and we saw nothing till the next morning at Navajoa and Cajeme, big towns, where they have modern systems of irrigation, and great factories. After Cajeme we had the same escort of soldiers in armored cars to defend us as we passed through the Yaqui country. Each railroad station had much the same protection as we had seen above, namely, a dirt wall about six feet high, and behind that a trench filled with soliders' quarters, generally forming a square, in the middle of which was a two story square fort made of adobes, and a cupola on the top for a lookout. There were no field pieces, the weapons being only rifles and machine guns. The brush was entirely cleared from around the railroad on both sides for at least 100 yards, and outside the dirt wall were strings of rifle pits, which consisted of holes about six feet long by two feet wide and a foot deep, just enough for one solider to lie down. Often these pits continued along the track for a mile. Soldiers were everywhere at the station and their women with them, but there was little evidence of any real drill or order among them. At Vicam station was the center of the Yaqui and a mile or so toward the sea was the town or capitol of the nation. But when I was there the town was deserted, and there was nothing at the station but the ashes of the Yaqui huts that had lined the railroad track for half a mile. It was at Vicam that the Yaquis robbed a train and massacred some of the passengers a short time before I was there. It was also at this station that they held up General Obregon's

train, and could have massacred the whole train load of soldiers and civilians, but by a ruse he got in touch with Guaymas and let them know that he was surrounded there by Yaquis. This led to the immediate dispatch of a train load of soldiers who got there just in time to save the General. The Yaquis, finding themselves outnumbered, decamped, and the soldiers in revenge burnt all their dwellings. Near by is a long range of mountains which has always been the rallying point of the Yaquis, and to this they retired. The Government bombed it with airplanes but never dared to send troops into it. The soldiers were deathly afraid of the unerring aim of the Yaqui marksmen, and of the deadly hatred for them. When there were too many soldiers for the Yaquis to exist on the plains they scattered to the various mining camps and worked in the mines and sent supplies to their families in the brush. Many of them crossed the border and got work in the American mining camps, but there were always enough to keep the soldiers in hot water. Finally the Government, finding that they could not drive them out nor kill them, renewed the old pension system of paying every Yaqui so much money per month so that he would not fight them. And this seems to be the arrangement today.

We reached the suburb of Guaymas, Empalme, at night, and remained there all night, till 8 a. m. the next day, when we pulled out with our usual quota of soldiers. We passed through Hermosillo and then Oritz, where we dropped our military guard, and rambled along to Nogales by midnight. Nogales consists of two cities, one on each side of the line. Nogales, Arizona, is an up-to-date American city, with clean streets, and modern improvements, and sober and intelligent people. It goes up to a certain wire fence some ten feet high, which forms the Boundary. On each side of this fence are the custom houses of the two nations. On the American side I saw no confidence men nor grafters. On the other side were plenty of men waiting to skin a stranger or get a graft for pretending to help him to get his baggage acrossthe line. What these men do not know about customs would fill a cart load. My baggage was duly inspected and passed. I then got a man with a cart to haul it over the line to the American custom house. There, after asking my business, they passed my baggage without inspection, and I soon had it checked for home.

Then came a strenous summer of study and work getting my sets ready to distribute, but I could not get done in time to go down in the fall as I wanted to do. It was again winter when I was ready and found myself at Nogales in 1927. There was nothing in bloom at Nogales. The train schedule was the same as before, every other day a train going south, which was a regular passenger train as far as Guaymas. Thence southward was a mixed train.

I spent a day at Guaymas in an excursion by motor boat to the mouth of the bay, and botanizing on various islands. The next day I botanized on the mountain to the north. Then the third day found me on the train bound south. We took on the same quota of soldiers as before at Empalme, and passed through the whole Yaqui region as before, and the second night we reached San Blas, Sinaloa. This is one of the

oldest towns in western Mexico on the Fuerte river, and is about 50 miles from Toplobampo Bay. It must not be confused with San Blas, Nayarit (Tepic), which is a seaport, which was explored long ago and the flora reported by Hooker and Arnot in Bot. Beechy. This San Blas is at the junction with the railroad that goes from Toplobampo Bay to Los Mochis and on to the Sierra Madres and central Texas. But at that time was completed only 60 miles east of San Blas. I spent a littel over a week at San Blas, and then took the stage for Los Mochis, 30 miles off. This is a modern town with a sugar factory, and is the center of the great tomato and mild chili gardens, which ship train loads of tomatoes and peppers daily in January, February and March, before the Imperial valley producers get on the market. I was escorted around by the superintendent of one of the great concerns, and collected some plants on the way. Then I returned to San Blas and took the next train for Mazatlan.

I reached Mazatlan Saturday night, and had to stay there three days till the next train came along. This time I put in on strenuous botanizing.

The train pulled out in the morning and we spent the day dragging along to Tepic, following up a river leading into the mountains and away from the sea. From Mazatlan southeast there are several low ranges of mountains more or less parallel with the main Sierra Madres, which as usual form the crest of the drainage from Arizona to the volcano of Colima. Between the ranges are valleys affording some arable land, here and there, where there are cities and settlments of smaller size. Tepic is one of these. It is a quaint old city, with typical Mexican architecture, a great cathedral, central plaza, and paved streets, paved with cobblestones. All around the plaza are stalls or booths, where the natives sell all sorts of produce and manufactures, and gossip all day. The central part of the city is full of fine Mexican stores, and swell hotels, after the Mexican fashion, where you pay 4 pesos a day for room and board. I stopped at the Hotel Bolo de Oro, or Golden Bowl. Just before I got there the President of the republic had sent some soldiers to arrest the Governor for some defalcation. So he was promptly deposed and a new one put in without making any particular ruffling of the surface. So easy do the natives take this modern despotism called a republic.

Tepic lies in what seems like a round valley hemmed in by volcanic hills which are one to two thousand feet high, and toward their tops have forests or at least scattered trees of live oak and pine. I should judge that it is at least ten miles across the valley. The Tepic river comes in from the southeast and meanders along, half marsh and half river, often completely bridged by Trapa, and seldom if ever over 4 feet deep. In it the cattle walk up almost to their necks and browse on the Trapa, eating swaths through it. The ground near the river is swampy and full of grass, and hard to get through. Then come fields of cane, and on the higher lands grow corn and vegetables. The river meanders out of the northwest corner of the valley, and thence down toward the Ocean. Tepic is a very old town, but an educational center, and has an unusually intelligent population. It is on the very old *camino real* that comes in from central Mexico through Guadalajara. This road is a wide trail, and is

deeply furrowed by the feet of many thousands of animals. In places it has been converted into a wagon road. Trails lead out in all directions from Tepic into the adjacent mountains. It was here that I was warned not to go out into the country for fear of brigands. This warning was given me before I left California. At Tepic I met people ranching out in the mountains, and who had come in on horseback to transact business in town. One of these men, an Englishman, became friendly to me and wanted me to go out to his ranch and botanize there. It was a two days' ride out in the mountains. I asked him how about bandits. He said, "Well, I have been here nine years and never saw any." It should be remarked that Mexicans are usually peaceable and harmless, but they live from hand to mouth, and are the prey of political grafters, and in dire necessity from shortage of food are potential bandits. Then just now there is general hostility to the Calles government because of its expulsion of the Catholic clergy. The rank and file of the Mexicans are Catholic, and the women resent most strenuously the expulsion of the priests. No doubt that clergy was responsible for many iniquities, political, for they cannot keep their fingers out of politics.

I paid no attention to any warnings about bandits, but went out into the hills to botanize wherever I thought I could get specimens, but I did not do the region thoroughly for lack of time. It is a rich region botanically. On the mountain a few miles south of Tepic I found a rich flora on its lower slopes, below the pines. There was a runaway irrigation ditch, that in some great storm had cut a gully 50 feet deep through the gravelly soil as it came out from an old ranch. This gully was perhaps a mile long, and rarely over 20 feet wide, and with mostly vertical sides, and was a mass of vegetation throughout, no end of ferns and herbaceous plants. It surely was a treat to botanize there. Then on the open slope of the mountain were all sorts of flowers, mints, lobelias, various species of plants belonging to the Evening Primrose family, Erythraeas, Lopezias, Compositae, Solanums, and many ferns I never saw before. For three successive days I tramped up there some five miles from the city and came back loaded with specimens. Then I spent a day along the river, we would call it a creek. It was 15 to 30 feet wide, flowing very sluggishly, and with mud banks little above the surface of the water. In a number of places the water was bridged by the water hyacinth (Trapa), forming a complete carpet over the surface. This is the same plant that forms such floating islands on the lower Nile in Africa, and covers many rivers in Florida. The cattle are very fond of it, and I saw several cows walking along in the middle of the river and eating a swath through it, and only their backs showing above the surface. They would not dare do this along the seacoast where the alligators abound, but at Tepic there are none. I saw no venimous snakes. There were several places that I desired very much to visit there but lack of time prevented. I then took the train some 70 miles up the railroad into the mountains to Ixtlan, and I botanized there three days. At this point there is a very old and much used trail leading south and east into the Guadalajara country, which is on the other side of the Sierra Madres. This trail was in some places

20 feet wide and with half a dozen paths cut down several feet into the soil by the feet of saddle and pack animals. There are no such trails in the United States, not even in the mountains where there never were any wagon roads. It takes a strong imagination to realize that for hundreds of years, while our own country was in the making, the Mexican mosos were trudging along over these age-old paths, even before the Pilgrims landed on Plymouth Rock Here they have eked out their scanty living and lived their tragedies, and got nowhere under Catholic rule, while the Protestants at the north have carved out a nation second to none. We can hardly blame the Villas and Maderos who have seen the contrast and given their lives to redeem their people.

After three days at this quaint old town of Ixtlan I again took the train for the end of the road, some 30 milesfarther, at La Barranca, which lies at the foot of the Sierras. This was just an old ranch and a temporary construction camp. After some hunting I got a buggy canvas cot in a brush shed for a peso a day, and had to hunt my meals where I could. Barranca I suppose means a box canon, and there was a box canon nearly 2,000 feet deep that the railroad had to cross on a bridge that was being constructed. This canon was so steep that it was almost perpendicular, but I managed to get down it by climbing down the vines and grass, and I reaped a rich harvest of specimens on the way. Then when down to the bottom I had to climb out again, and this was no picnic, but I got out some miles farther up and along a draw that had a ranch or two along it, and some sugar cane growing. But it took me all day to reach the bottom and back again to the town. I made the richest haul of botanical specimens here of any. Then the next day I lugged my baggage back to the station and checked it for Acaponeta, which is about 70 miles out of Mazatlan, and between Tepic and Matzlan, and only a few miles from the Ocean. When I was making a pack horse of myself to get my baggage to the station the train came in, and a crowd of passengers got off and took saddle horses or burros or went afoot on the trail to cross the barranca and get to the other end of the road coming out from Guadalajara. As I passed the crowd a well dressed Mexican shouted from the crowd, "Hello, hombre" at me. Then I took another look and saw that he was a Government official that I had met at La Paz the year before. So we waved our hands and smiled at each otheras we passed.

I had to stay all night at Tepic, but the next morning the train was made up for the trip north. It was a delightful down the river and out on the costal plain at Acaponeta, which we reached in the evening. This whole region has always been infested with bandits, and doubtless this was the reason we did not travel at night, but we had no escort of soldiers, and of course saw no bandits. It so happened that a good hotel was at the station, on the city side, and I had met the proprietor before, and so I was soon in a good room and my baggage around me. Across the way from me was a military post with a company of soldiers. Acaponeta is quite a city, and it was about a mile from the depot to the center of town. At the hotel in the city I met an Aemrican engineer who was working, with other Americans, the El Tigre mine, some 26 miles to the

eastward, up in the mountains, and I was cordially invited to call on them at the mine, which was some 3,500 feet altitude. I began botanizing at once around Acaponeta. Like all the rest of Mexico it is all brush as soon as you get out of town. To the north was quite a mesa a few miles off, where I got many species. To the south of town was the Acaponeta river, 100 yards wide and several feet deep, and along it were some ranches, there was a large sugar cane plantation just across the R. R. bridge, where they were making sugar. In the river and up to their hips in the water were the women washing clothes. I spent about a week here till I got the bulk of the flora. Then I hired a Mexican and two saddle horses to take me up to the mine. It was a five hours' ride and we had to start about 4 o'clock in the morning in order to get well up before it got too hot. I had not ridden a horse for five years, and the Mexican saddle made riding a Purgatory for me. It surely was torture. After two hours of it I had to get off and walk. Then remounted and had more Purgatory till we forded the river soem 10 miles up, and began climbing the hills toward the mine. Then we came to a ranch where we got breakfast of tortillas, beans and coffee. The women cooked the food on an open fire as they all do in Mexico still. Then we remounted and rode along the increasingly steep trail to the mine. I did very little botanizing on the way up, but after a while we got into the live oaks. and then to the mine, which hung on the steep slope of a mountain, with quite a little town below, where the miners lived. It surely was good to get among Americans again and to get a real American meal and to sleep in a real Aemrican bed. I had a delightful visit with the engineers, and I arned much about the history of this, one of the most famous gold mines of western Mexico. I stayed over night and did considerable botanizing on the mountain. The next morning I started back and botanized almost all the way back to Acaponeta, getting many new things and one new f rm. The torture of riding was worse than the day before, but I could relieve it partially by getting off and botanizing along the way. I reached the city late that evening, but loaded down with fine things. Then came the long trek home, some 2,000 miles by rail. I did no further botanizing. I reached Mazatlan duly and stayed over night and then got all my baggage checked for Nogales, and by dint of getting a berth in the Pullman and my meals in the diner I got through in fine shape.

We reached Nogales, Sonora, about midnight, and promptly debarked and struck out for the American side, hiring a boy to carry my valise. At the fence the boy said he was not allowed to go farther, and so I paid him off. Then I had to hire another man to take me the rest of the way. The guards passed me with little fuss, and I landed at my hotel, happy as a clam to get back into America again. It surely did seem good to see the stars and stripes again. The next morning I went over to get my baggage. I had to visit the custom house to get my passport canceled. Then went over to the baggage room and was wiating for the inspectors (Mexican) to look over things to see that I was not evading any export duty. I was standing there in some trepidation for my turn when a slap on my back and a cheery "Hello, Professor," from the chief

inspector, and a hearty handshake. I surely was relieved at such a warm reception. After I got my breath I said, "I have seven big bundles for you to inspect." He turned to the examiners and said, "Esta Bueno," and waved his hand, and I thanked him and passed out with all my stuff without inspection. Then at the Aemrican custom house, on the opposite side, the chief inspector said, "Is it the same old gag?" I said, "Yes." "Then go on," and away I went, and soon was all checked for home. I learned long ago that the way to get along with custom officials is never to try to put anything over on them and to keep my mouth shut.

Then, after a week's rest at home, I pitched into numbering my plants and labeling them, which took all summer before I had my sets made up and ready to distribute. But I had not yet studied them to identify them.

Time slipped by very fast till it was January again. Then I took the steamer Jeanette R., on January 12, for San Jose del Cabo, after paying $40 for my passage. Then began some dirty little grafting by Hansen, the owner of the boat. I was informed that the boat was a freighter and could not carry passengers and that for that reason I would have to sign up as a member of the crew. Then I was told that members of the crew could not carry baggage and all my botanical stuff would have to be shipped as freight. Hansen had already put my things on the manifesto. I did not know what it meant, and did not care so long as I got to my destination. After 4½ days of sailing we reached San Jose del Cabo and were landed in the surf. Then I found I had to pay freight duty, and Consular fees amounting to $10. Then I also found I had been skinned out of $5 more than the regular fee for passage. And so I found that the Mexicans are not the only grafters.

I found a very kind and considerate friend in a native Mexican, Mr. Consaca, wha was president of the board (city council) at San Jose del Cabo. I spent a very strenuous and profitable week there botanizing. Then one day chief of police, an intelligent and efficient young man, came to me and asked if I had a permit to botanize in Mexico. I said "No." "Then,' he said, you cannot work until you put up a 1,000 peso bond and get permission from the Secretary of Fomento (Secretary of Agriculture) at Mexico City. My Spanish was not adequate to a discussion of the matter with him and so I took him to Mr. Consaca, who interpreted for me. I had been informed before I left Claremont that such a law had been passed to cinch us foreigners the year before, and I was warned not to go to Mexico and attempt to collect But I thought I might bluff my way through in some way, and so I did not and would not put up any such bond. In addition the law required that I give the best set of specimens to the University of Mexico. I thought the matter over night and then decided to go to some other city, where they did not have a chief of police, and work. But consulted friends, all of whom advised me not to do it, for they said the officer would telepgraph ahead to any place where I went and have me arrested and fined heavily if I tried it. My only recourse was then to go 125 miles north to the Capitol and see the governor and have him fix me up, or leave the country. So

I struck out for the Capitol, leaving my baggage to be brought later. The first person I met there was Don Carlos Leon, an old friend, connected with the Federal Government in Mexico City. After a hearty greeting I told him of my mission, and he remarked that there was a professor from Checkoslovackia who had been there a month and was also hung up for the same reason, but that he would do all he could for us. I did not hesitate to speak in very plain terms to my friend, calling it a dirty political holdup, and saying that if it could not be fixed up I would go back to California and let the folks of Lower California starve. It is a well known fact that Lower California depends on California for its market, and for us to let them alone would mean bankruptcy for them. For this reason the Calles government has been in bad odor with them, and there is no sympathy for the baiting of Americans that was so characteristic of the Calles government, till President Coolidge called Calles down harply and told him just where to head in at. Since then Calles has been a vociferous friend of the United States. Most all this baiting of Americans arose during the World War, and was fomented by the Germans systematically, who loudly said we were afraid to fight. But Coolidge put a thorough crimp in it once for all when he plainly told Calles where to head in. No doubt Calles would have been promptly deposed if he had not come to time. It is not generally known that the Calles government was also responsible for the passage of hostile mining legislation that has caused nearly all American investors and miners to forsake the republic. I was told at Acaponeta that the taxes were 28% of the gross output of the mines. This was the cause of the shutting down of all but a very few of the biggest mines in Mexico.

After waiting three very precious weeks at La Paz, in idleness, I got a letter from the Governor authorizing me to work without interference. It also took the entire three weeks to get my baggage delivered at La Paz. Then I got to work strenuously again. Then took a trip to Todos Santos on the Pacific coast and spent a very profitable week there, making also a short trip to the base of the Laguna mountains at the Cota ranch, where I found much interesting material.

Then I went back again to La Paz, and the Check professor and I arranged a joint trip back to Miraflores (40 miles from the Cape), where we remained a week and took a trip up the Laguna mountains, on horseback. We were fortunate in getting my friend Pickett to take us in his auto 90 miles to Miraflores, which is about 40 miles northeast of San Jose del Cabo. On our way there we stopped for lunch at San Bartolo. This is an old town located at the great springs which break out of the hills not far below the divide which leads down to the sea south of San Antonio. There many palms abound, and there is much cultivation of fruits which find a market at La Paz. This is a unique region, with many interesting plants. Thence the road drops down rapidly to the sea, which is skirted for some 10 miles to a ranch, and then it climbs up on a mesa-like region, and over on the San Jose river, which drains into the sea at San Jose del Cabo. The first town on the river is Santiago, where they have a sugar mill. Then it is some 10 miles to Miraflores, which

tains. When they found we wanted to explore the mountains and go to the top they told us it was impossible to get there because the trails were all washed out the previous fall. Finally they agreed to let us have one horse only. So I told them we would pack the horse and walk. It is rank heresy for a Mexican to walk. So they finally agreed to let us have three horses, one each for us and the g uide. My horse was a mule. In my younger days I was so nimble that I could put my hands on the back of an animal and jump clean over him; now I was so logy that I had to climb on or be boosted on. Then the Mexican saddles are not made right, and a person has to ride with his back kinked. Then the stirrups were too long and could not be taken up. So it was Purgatory to ride at all. But we were fixed up at last and started off. The saddle of the Check was not properly cinched up and for that reason turned on him before he got out of town, and let him down on the ground. This led the horse to antic up, but he was calmed down soon and the saddle replaced and properly cinched. Then came the long trek over the mesa through the brush for 10 miles in the fierce Tropical sun along the trail. Then we came to another river coming out of the mountains, and along it our trail wound up and down across the deep gulches that came in from the sides. Going down one of these 30 degree slopes my own saddle turned and let me down on the rocks on my hip, injuring me considerably. Then my mule, which never had had a saddle turn on him before, got frightened and began to kick and paw the air full of holes. I never saw an animal kick so fast in my life. Then when he could not get rid of the load under his belly he turned to run away up the trail. But the Check was coming down and so blocked the way. The mule then jumped off and fell some 50 feet to the bottom, rolling over and over on the way down. Then he picked himself up and kicked himself loose. By this lies on a mesa lying in the angle formed by a tributary that comes down from the Laguna mountains, which lie back a few miles to the northwest. Miraflores is also a very old town, where they raise much fruit for the San Jose del Cabo market. Everything is primitive, but there is a church, a school, and a few stores. The barber is a rancher who lives out a way and comes in to shave his customers at their rooms. There is but one so-called hotel, a residence of five old maids, old maids are a curiosity in Mexico. The accommodations were typically Mexican, consisting of a canvas cot without bedding, a chair, and a stand, also a kerosene lamp with a dirty chimney. On a back veranda was the eating table, where they served meals, which were brought in from an adjoining house where they were cooked on an open fire. The old maids were curious to see us as we changed our driers and took care of our specimens, and they asked all sorts of questions about them. But they were very polite. The Checko-slav Professor was a young man who could murder the Spanish language a little better than I could, and so he became the chief spokesman. One of them tried a little to vamp him but he was woman-shy. I was a little too old for the game and so was not bothered in that way. After a few days of exploring along the rivers and in the foothills of the range we hired a Mexican to take us up into the moun-

time the moso (Mexican guide) had caught him, and began to toggle up the saddle. Finally it was ready and he asked to have me get on again, but I saw the mule was still frightened and doubtless would begin pitching as soon as I got on. So I refused to mount but walked a few miles to the next ranch, where we swapped off my mule for a better one. After an hour's waiting here and drinking some good milk, we remounted and the Purgatory of riding began again. The trail was the worst one I ever was on, going over and through granite boulders of all sizes, where there was hardly room for a mule's foot, and where the rocks would scrape our legs as we went along, or the brush would tear our clothes. Often the way was so steep that we had to cling to the manes to keep from sliding off, or ride on the horn of the saddle to keep from falling over the mule's head. By night we got to an elevation of 3,500 feet, where a cattle ranch had been once, among the live oaks. Here we wearily slid off our animals, unsaddled and crawled into our blankets. Then came half a night of agony trying to find a place to lie on that did not hurt. Then a short respite of sleep. The next morning, after a hasty breafast, I started out to reap the rich harvest of botanical specimens that formed this veritable floral paradise. It took the most strenuous work till 4 p.m. before I had gathered the flora. Then the Check decided that he could not stay over night for fear he would not get back in time to catch the next steamer at La Paz. So we back-tracked four miles to the river that afternoon and camped in the brush, and the next day we reached Miraflores, loaded down with scientific plunder and dead tired and worn out. Then a night of real sleep, and the next day a strenuous one taking care of our stuff. This ended my botanizing in 1928. In due time we reached La Paz, just in time to miss the Checko-slav's steamer, and to catch my own steamer for San Pedro. I had some trepidation as to how I would get all my 14 big bundles of botanical specimens home. But I followed my usual custom of sawing wood and putting my stuff on board without any fuss. The custom officials did not bother me nor ask any questions, nor did the steamer officers list my baggage as freight, as I had feared they would. The Americans on board, when they saw how well I go along, warned me that it would be different when I got to San Pedro. Well, at San Pedro I showed my papers and the inspector passed me without question.

After a week's rest I began sorting out and labeling my collection, which took me till June. Then I bundled a complete set of all my plants into an auto and struck out for Berkeley to compare my material with that of the Brandegee herbarium there.

I spent five very busy weeks at Berkeley till I had determined the names of most of my species except the new ones. Then a return to Claremont and a systematic study of all the literature followed, which consumed the rest of the year. I had already spent much of three years in making out a complete list of all the plants known to exist in the entire region. The results of all this work are embodied in this report.

BOTANICAL NOTES MADE ON MEXICAN FLORA ON TRIP IN THE MONTHS OF OCTOBER AND NOVEMBER, 1926

Nogales, Arizona, is on the drainage of the Santa Cruz river, 59 miles south of Tucson, 3,800 feet altitude, and over 1,000 feet higher than Tucson, in the upper edge of the Tropical life zone, screw-bean area. The topography consists of rolling volcanic hills, apparently sand, seemingly stratified. The shrubs are mostly screw-bean (Prosopis pubescens), some Sambucus glauca, some Fraxinus (pistaciaefolia), Baccharis sergiloides, rarely a scrub oak (Q. undulata?), but screw-bean everywhere even on the hills. Some Yucca (like Mohavensis but not that species), but leaves shorter, Nolina, Daslirion, rarely Opuntia of the occidentalis class. No Cereus. Hills covered with grasses which are mostly Bouteloua curtipendula, eriocephala, an annual sp., hirsuta, Eragrostis, Muhlenbergia debilis, Andropogon scaccharoides, glaucus? Panicum autumnale, P. scoparium ?, Sporobolus ramulosus, cryptandrus. Tragus, Aristida Californica but a grass 1-2 feet high and very abundant, Heliomeris annua very common. Aplopappus gracilis, Verbesina encelioides, Ipomoea 3 species, Lagenaria, Acalypha, Euphorbia, prostrate species, Pectis, 2 sp. Brickellia.

October 25, 1926. On train going south, 4,000 feet altitude. Still going up, out of the mesquit and into the live oaks (shiny black oak). Villanova common. Senecio Douglasii common. Ambrosia, Aplopappus gracilis very common, some Heliomeris. Country is a great rolling prairie with much oak and a little drier than Nogales after we reach the top and begin to descend. Agua Zarca Station, 3,800 feet altitude. Oaks nearly gone, mesquit coming in, Xanthium on flats, Heliomeris, Fraxinus pistaciafalia, also Populus Fremonti on flats. A pond of water on the left and ranch. Salix amygdaloides (group) Grasses the same as before. Sambucus glauca. Cultivated squash, corn. Eriogonum annum, Chenopodium ambrosiodes. Smooth outlines of hills show they have long been grassed over. Baccharis sergiloides. Walnuts (Calif.). Now come to a stream flowing south. Chilopsis, Acacias, Beorchaavia, brush houses. Spirogyra, Dalea mollis ? Setaria glauca. Celtis occidentalis, Vitis Ariz., Ambrosia very common. 3.300 feet altitude. Oaks now gone, mesquit everywhere. Cult. potatoes and corn, Crotalaria. Cibuta Sta. Big black willows (S. amyg. ?). Amarantus fimbriatus, Celtis, Helianthus annuus Platanus, screw-bean, big Celtis occidental, 40-50 feet high. Pluchea borealis, scattering oaks again. 3,100 feet altitude passed through canon with quartzite looking eruptives. Thurberia, Baccharis viminea. Station, did not get the name. Dense brush, peach trees, Vitis, Walnuts, Celtis, Setaria glauca, Cucurbita perennis, sunflowers 10 feet high. Quite a stream on the right, much Platanus, Fouquiera on the hills. 2,900 feet altitude. Grass much shorter, Cylindropuntia prolifera group, also spineless flat Opuntia and large, not cultivated. Cumeral station. Umbrella tree (Melia azedarac), much mesquit, much Fouquiera splendens, Baccharis sergiloides, a little Heliomeris, Rhamnus-like shrub, Ambrosia trifida or something that looks just like it, 10 feet tall or more, in moist

places in fields, mistletoe on Mesquit. Ranch, black soil. Condalia ? Megarrhiza. Immuris station, 2,700 feet altitude. Red-headed Mexican woman. Mulberry tree, tall white Gnaphalium, Eupatorium-leaved Brickellia, more Ambrosia (like trifida), much Salix amygdaloides and Populus Fremonti. Cross stream, 10 second feet. Ranch. Another Baccharis like sergiloides, bamboo.

Imuris station, 2,600 feet altitude. Town on mesa. Baccharis viminea. Small river 20 feet wide. Heavy flood damage evident, many cottonwoods down, flat badly washed. Erigeron Canadense species. Red Ipomeoea. Eucalyptus vimineus, a fruit looking like an apple but with an umbilicus (a quince), they call it vijos, and membrillos oranges, olives.

Pierson station.

San Igancio station. Now in wide valley, much vegetation, getting hot. Mountains 2,000 feet high 5 to 10 miles off. Corn. Soil very fertile. Opuntia Tuna, many tree (black) wlilows, Sorgum Halapense. Red and tall Mallow, 3-4 feet high. Ambrosia 10 feet high. Much Sambucus, Membrillo trees all browsed up 5 feet from ground. Annual Bouteloua (prostrata ?). Nicotiana glauca. Much Hymenoclea. Sugar cane. Corn.

Magdalena, 2,300 feet altitude. Chaenactis, small leaf, Ambrosia psilostachya still here and there. Phoenix Canariensis. Houses dilapidated. Erect Cereus Schottii. Fouquieria used for fences, and growing. Cement works. Bamboo in flower in long spikes, another river coming in from the east (Magdalena river). Black lava flows cracking up in square blocks and forming vertical faces. Opuntia Tuna 20 feet high, cultivated. Cultivated grapes, castor oil, corn. A low Fouquieria. Thicket of Mesquit, Opuntia leptocaulis, big morning glory or leguminous vine. Opuntia like leptocaulis but 3-5 feet high and branches thicker. Big and smooth Atriplex shrub, canescens group. Salvia sanguinea or Mimulus glutinosa, red. Shrubbery on alluvial bench and slopes is dense. Eremocarpus or Alternanthera. Fences of Fouquieria. Cotton gin.

Santa Ana station, 2,100 feet altitude. Little town of adobe. one-story house below the bench. One Fouquieria in bloom. Now 2,000 feet altitude. Gutierrezia, Larrea brush still dense. Fouquieria in leaf. Forest of Cereus giganteus. Little grass now. White Zinnia. Parryella shrub, may be a Dalea. Aster canescens. White Alternanther. More grass now, bench land away from river now. Villenova, Ambrosia, Megarrhiza, mesquit, palo verde ? Olneya ? Boerhaavia, Cereus giganteus (may be Thurberi), tapers toward tip. Acacia Greggii, two species of annual Bouteloua, flat Euphorbia, Cereus like Engelmanni but shorter. Palo verde, Opuntia frutescens, O. Bigelovii but less spiny. Larrea in bloom, Pectis, Baileya, large species. Much Cylindro-puntia now, Tribulus (brick-colored species), mesquit dense, Opuntia leptocaulis 4-6 feet high. Now on wide plain and mountains far off. Grass a foot high.

Llano station, 2,200 feet altitude. Saw a Cuscuta on Tribulus. Buzzards are coming in now. Some date palms. Thorny Rhamnaceous shrub (not Condalia), Zizyphus ? Acacia, cats claw. Baccharis sergiloides, Hymenoclea, occasional mistletoe on Prosopis, Lippia, few grasses

now, mostly Bouteloua annuals. Lycium, small leaves. Blue flowered Ipomoea. More grass. Allionia imcarnata.

Noria station, 2,350 feet altitude. Still on the plain. Mountains five miles southeast, two mines there. Mesquit, Condalia. Low Hoffmanseggia in fruit. Little Tribulus. Vegetation dense, Mesquit, Olneya, Condalia here and there. Opuntia like Bigelowvii, O. leptocaulis. Cereus (Thurberi), simple stems from point of branching near ground. Euphorbia misera, Hilaria mutica, Cereus like gummosus. Euphorbia, flat species. Erigeron, tall and with purple flowers, annual.

October 26, 1926. On the plains passed over there was much high water the last of September, and everywhere washouts and ground scored. Soil is sandy and reddish mostly. At Queribabi our train stopped, small station with water tank. Many cars, autos, waiting. Waited almost an hour and then hired a boy with a Ford to take me to Carbo, 44 miles, for 20 pesos. Road goes through a fair but bumpy country, winding through the mesquit, and into and out of gulches recently made by the flood, with some heavy sand. Saw vine with red and apple-like fruit climbing over trees (Cardiospermum). Fruit looks like an apple but is bladdery. Also saw for the first time a chimney cleaner Cereus they call viejo (old man) because it has a long and white beard all over, 10-20 feet high. Other Cereus also frequent. No Cereus giganteus. Mesquit and Olneya common, also Condalia. Low shrub with glossy leaves that I called Euphorbia misera; may be a Jatropha. A big and bushy Encelia, like cordifolia is common, also a triangular, long-leaved Franseria. No Fouquieria.

Carbo, 1,500 feet altitude. This had been quite a little town with half a dozen stores and some houses along the track, but half of them had fallen down in the last rain. I botanized some while waiting for the train to pull out the next morning. I found Fouquieria peninsularis common, also a low Cereus a few feet high, and the two Opuntias, also the bottle-brush Cereus once in a while. The green palo verde was in leaf and resembled a Parkinsonia. Cardiospermum was here also. As we passed down toward Hermosillo the ground became flatter, more sandy, and the shrubbery not so thick, but the same species. Everybody was interested in my valise, which was recovered, but few could talk English, and I could not understand much Spanish. The Fouquieria peninsularis is rarely 10 feet high and is now so leafy that it reminds one of Lycium. We now see another Cereus (Thurberi) which has fascicled stems, often is branched twin-like above or with a side branch below, never is half a foot thick. Datura Stramonium, Encelia very common, also Franseria, the long-leaved one, annual Boutelouas forming swards, little other grass, mesquit and palo verde equally common, mesquit has dark and rough bark, the other is smooth and green (the palo verde). Birds scarce, no other animals. Yesterday I saw a jack-rabbit with light ears, white flank and a broad and dark stripe along the back, also a road runner. Bed of river is 100 yards wide and 10 feet deep and no water in it now, on the left. At its flood it must have been at least 10 feet higher than the railroad track, which was here obliterated for over half a mile. We are now

crawling along over the new track, brush all down, flattened down, little pools still here and there in the bed. Skies clear. Rivers must have been at least ¼ mile wide at flood, but no water in it now. Some call this the Piscaya river. There are some oak looking trees, may be olives, 20-40 feet high. 1,300 feet altitude now. Populus Fremonti cultivated. Tall, bushy Cereus common, may be Thurberi. No farming in this region, all cattle and few of them.

Zamora, 900 feet altitude. A few tumbledown houses, no cultivation. Grass mostly all gone. Brush everywhere, mesquit and palo verde, also a thorny airy shrub 10 feet high, may be Zizyphus. Ambrosia psilostachya ? Franseria. Low leguminous shrub, same as I got at Carbo. Tall and tufted bottle-brush Cereus, Datura, Encelia, low Bouteloua, Jatropha ? Blue Ipomoea, white Alternanthera. Palo verde, a Parkinsonia aculeata, white flowered. Acacia, a low shrub with flat pods. Buzzards again. Large Opuntia, Lantana ? Vegetation all a little past. Had a rain lately here. Low Cereus. No cactus area like that at Tucson so far, but Cereus scattered in the brush, almost no flat Opuntias, no Heliomeris today so far. Some flat Euphorbias, Oleander. Populus along creek. Megarrhiza, dates, also Erythea, oranges too. Opuntia Tuna, a narrow one also with acute tip. Large hill on right with many tall Cereus, also bottle-brush Cereus and flat Opuntia like occidentalis. Sorghum Halapense. Oranges starting to turn, no real cultivation of oranges, bamboo, figs, real palo verde, sugar cane. Helianthus annuus, bushes covered with Megarrhiza. Brick-colored Tribulus, devil grass, Baccharis viminea, bamboo in fruit, Aralia cultivated. Xanthium, Populus Fremonti, Agave with long and blue leaves, very old dates. Now at Hermosillo at foot of high hill. Many buzzards. Asclepias subulata. Fleecy clouds and stratus ones, very hot all night, many mosquitoes. The adjoining hill on the south of town is 500 to 1,000 feet high, all marble, being worked for lime now, has been worked considerably in the past. It rises in massive cliffs, but has no ferns. Hermosillo has about the same aridity as Victorville, California, or a little less. It is watered by the Sonora river, whose bed is ¼ miles west and is half filled with very shallow water, sand everywhere else, banks very low. Parkinsonia aculeata grows cultivated along the banks of ditches, is rarely 30 feet high, apple-tree-shaped There is another species of the same genus, a tall tree, 75 feet high and very slender and straight, cultivated in the streets and parks. There is a big tree. 50 to 60 feet high, with gray bark, fissured lightly in linear areas and has the fig habit, and with large buttresses at base and leaves of Aesculus, 5-6-palmate, it is a Ceiba probably, forms a fine shade, cultivated. In crevices of rocks on the mountain is a little Mamillaria with linear-clavate red fruit about an inch long, and with one central black and crooked spine that resembles M. phellosperma. There is a large and shrubby Opuntia like leptocaulis (which I have so far called frutescens) that seems to grade into our California leptocaulis, and is rather common from Magdalena south. There is a flat Opuntia with long and white primary spines and yellow secondaries, like occidentalis, but rounder in outline. They also grow here a narrow Tuna. The Pitayia Cereus

(Thurberi) is scarce and small on the hill. It has 13 ribs and black spines. No Echinacactus so far. There are two Euphorbias, one is an intricate shrub with small branches, and is 1-3 feet high, with pulp on the stems soft and juicy, hard to break off, liable to peel off from the central wood. This has the same habit as the bigger one with shiny leaves (Jatropha), with yellow and papery bark which has no white sap and is 3-6 feet high, leaves turning yellow, no fruit or flower. This latter I took at first to be E. misera. Then there is a long-leaved Lycium with red berries, 2-3 feet high, also a Zizyphus-like Dalea, and several tender and very slender leguminous shrubs of the Acacia habit, some of them spineless. Saw the black-spined Prosopis pubescens, also saw a few that I think is the screw-bean, but no pods. Encelia cordifolia ? is very common on the hill, also Cassia Covesii ? a shrub with very many stems in a clump, this may be a mallow, both kinds look alike, but the Cassia is here too but less clumsy. There is a flat growing Euphorbia Fendleri ? and two species of narrow leaved ones growing with an oily Pectis. Allionia incarnata is common. Alternanthera lanuginosa is common. There is a Perityle, a shrub, a few inches to two feet high, with yellow and scattered flowers growing in clefts of rocks. Shrubbery dense on the hill. The marble is worn smooth, is granular, and mottled. Saw also in the city two cultivated Echino-cactus.

New Year's mine, 1,150 feet altitude, 20 miles southeast of Hermosillo on the eastern side of a lime mountain. The pitch to the west is 30-45 degrees. Quartz-porphyry on the north of the hill, but the formation is mostly granular lime. Vegetation is about the same as at Hermosillo, but with a few new bushes. There is a small tree with white and flaky bark, which they call birch. It has a flat top and few stems, is 20 feet high and grows only on slopes and ridges, and has wand-like branches waving in the wind. It is no doubt Lysiloma candida. Then there is another similar tree but stiffer, but deciduous leaved, and many branches and a pyramid outline that evidently produces shellac, so it must be a Bursera. There are two species of this kind with pinnate leaves and has a round nut or berry. I saw also here Janusia, Lantana, Dalea, flat white Euphorbias, two of them annuals. One herb with pinnate leaves like a Bidens, probably a Cosmos. Near the tannery near Hermosillo grew Wislizenia as an herb about 4 feet high, three species of Bouteloua, one of them hirsuta and scarce, also three annuals, a tall one and a low one among them, also one like curtipendula. Saw one specimen of Fouquieria splendens, also F. peninsularis in full leaf, and in bloom. The three species of Cereus, Thurberi, Pringlei, and bottle-brush, occur, also one that looks like Schottii. The bottle-brush often grows in large clumps, the ribs are 5 to 7, while the other are 13. Vegetation mostly very dense now. A tall Bouteloua annual is frequent, also some Setaria glauca. Wislizenia grows erect and then spreads out into a much branched and rounded top, fruit very small, the plants scattered along the road and on the edges of fields.

October 29, 1926. Rained hard at noon from the west, no wind. Hot before. The birch-like tree is a Parkinsonia aculeata, with the outer

bark yellow and inner bark white, with slender trunk like the birch, but more so, grows sparingly on the hills at Hermosillo, stems tufted. (This must not be confused with Lysiloma). Got a shrub 3-4 feet high, with habit of Lycium, having white and translucent berries like the mistletoe, but with a single black flattish and reniform. seed. Pulp juicy, berry ¼ inch wide, seed 2 mm. long, is thorny, bark gray and smoothish, about as in Amelanchier. Got it on the marble hill. Got an annual Perityle there. At this point I lost my notebook.

October 30, 1926. The tree they call Ceiba has 7 leaflets. There is another tree, cultivated, in the park, 75 feet high, deciduous, with very many fine twigs, apple-like top, bark like hard Maple, leaves simple, they call it pioche. The tall Parkinsonia-like tree that I spoke of above as being cultivated in the park is Casuirina distyla, a native of Australia. There is an arbor vitae in the park, Mexican cedar ? The Ceiba has bark like the palo verde till about two feet in diaemter at base, then gray and white with fine vertical fissures, a stately tree. Oranges here are pithy but sweet and thin-skinned. I saw some limes also. Oranges just starting to turn. The marble mountain at Hermosillo has porphyry dykes running east and west in it and 50 feet thick, which has marbelized the dolomitic limetsone. This marble weathers into granules about ¼ inch thick, which form the sand. The rocks are much smoothed by wear. The mountain has been quarried much in the past for tombstones, is hard, and in some cases has twisted grain. Vegetation on the mountain is mostly shrubby. The so-called Parkinsonia (Lysiloma) with the yellow outer bark and white inner bark has the bark cracking off like the birch, leaving the white inner bark smooth and with a green pulp underneath, then very compact and hard and heavy white wood. It grows scatteringly in the crevices. It is the same one described from Diller's mine, 20 miles out, 20 feet high, with flat top, and with several slender strict branches, has a very graceful and airy appearance, waving in the wind. Then there is a low and cordate-leaved shrub, 3-6 feet high, with the same kind of bark (Jatropha). Its leaves turn yellow with age, no flowers or fruit, looks like a Euphorbiaceous plant but sap not milky. It is a graceful plant with many stems. Beneath the inner bark is a very soft pulp which goes deep, but the center of stem is shreddy and does not break off readily, but the pulp peals off. The old stems are very soft. This is everywhere, giving character to the landscape. There is a mesquit-like shrub (same as I got at Manzanillo in 1893, Mimosa) with big and gladiate stipular spines inflated and occupied by stinging ants, much branched and spiny. The true mesquit is also there, and also the palo verde. There is a prickly and densely branched shrub with the habit of a Lycium, referred to above, but is not a Lycium. There is a true Lycium. 2-3 feet high, with long, flat and shiny leaves. It is spiny. Then there is the tall Cereus Pringlei, and apparently a few gigantea, also Thurberi, and the bottle-brush. There is a Mamillaria-like Goodridgii, a flat Opuntia with long white spines, 2-4 inches long and with rounded joints. There is O. leptocaulis, and another similar one twice as high with bush habit and with smooth and larger fruit. There is also the straight Cereus

Emoryi ? but very rare. I also saw a Passiflora at the mine, also a Lantana, a cucurbit vine, Janusia, Dalea with very fine (slender) stems, Allonia incarnata, 3 species of Boerhaavia, Boutelous 3 species, B. hirsuta, Setaria glauca, devil-grass, Ambrosia psilostachya ? Amaranthus fimbriatus.

Santa Rosalia. There is a copper smelter of 1,000 tons a day. The ore is a carbonate in Tertiary conglomerate, beach formation, and for this reason is very recent in origin. They have made an artificial harbor of concrete. There is a long whale-back, ten miles long and several miles wide, of sedimentary and sandy clays that arises on the east side of volcanic peaks, or a range, which I assume is a part of the San Pedro Martirs. Vegetation is about the same as at Victorville, California. Fouquieria peninsularis, Larrea, Jatropha shrub. Porophyllum 2 species. Bigelovia species but with 4-angled fruit, with pubescent leaves, 4-6 feet high, Petalonyx 2 feet high, Mesquit. Encelia farinosa, two species of Euphorbia, Croton Boerhaavia annual. Saw no Bouteloues. Setaria glauca occurs here. Saw three pelicans, one with white head and neck and blue body, one gray all over, one nearly black. A jumping fish about a foot long. Saw two porpoises at Guaymas.

November 5, 1926, Muleje. The landing has one house, and a light-house up on a rock. The town is three miles up the creek to the south. It is a little land-locked bay. Dates grow close by at a ranch, Spirostachys, a 4-angled fruited shrub on the beach, Encelia fainora, a Cereus, long and straggling on the ground on the rocks. Also a prolifera Opuntia. Below Santa Rosalia the first stop was at a penal colony on an island where there was interesting vegetation, a pile landing. Then in the night we came to Muleje. Very, very dry here. Saw bottle-brush Cereus, Encelia very common, Fouquieria peninsularis or splendens, can't be sure. They were cultivating a tree cotton. Saw a few Cereus Pringlei, a Perityle like a chrysanthemum (probably a Hoffmeisteria) a Porophyllum shrub, Begelovia same as Santa Rosalia. Saw an opposite-leaves shrub in the water for the first time (Rhizophorus Mangle). Saw a thick leaved Lycium, also a perennial Salicornia on flats, a Datura Stramonnium, very prickly.

Morning, on waking we are passing a low area, valleys, with hills farther back. Then this area drops down into a plain which goes back to some lofty mountains, 5,000 feet more or less high, running parallel with the coast but some ten miles back. There seems to be a wide tract or valley butting on to the mountains, which are sedimentary and palaeozoic, may be Cretaceous. Then comes a sharp escarpment 1,000 to 2,000 feet altitude on the coast, mostly sedimentary, but the main range continues south. The costal area breaks away into a mesa or low hills. Then comes a large island on the east. Then Loreto lies ahead ten miles more or less. Vegetation scattered on the hills but denser on the plains The giant cactus (Cereus Pringlei) is thickly covering the plain. There are no other trees. There are jagged mountains on the mainland, being a little to the northwest, but all stratfied nearly horizontally. There is an island about 20 miles long to the east and we pass between it and the mainland as night falls.

In the morning the coast line now is a long series of mesas, 1,000 feet more or less above the sea, Tertiary or Cretaceous. The slopes nearly vertical on the east, few jagged peaks, probably dip gently westward as far as the eye can reach, apparently a great plain behind. As we go southward the mountains drop lower and lower till they almost fade into a plain west of La Paz.

At La Paz Washingtonia Sonorae grows at tidewater along the beach. The bay shallows out to a low and sandy beach or water line for many miles northwest of La Paz. There is also a long and sandy spit north of La Paz, covered with Mangle. South of La Paz the hills begin at once in sloping mesas, like those on the island north (Espiritu Santo) and seem to be Triassic or Cretaceous. Then behind them come steeper volcanic hills or mountains, as though they had shoved up the sedimentaries between them and the sea. Along the beach there is a series of Pleistocene benches next the shore which are about 100 feet thick, or less, and in places full of shells. To the south of La Paz soem 30 miles rise higher mountains with mines which are at least in part eruptive. Cactus are very common, both Cereus Pringlei and Thurberi. The brush is abundant, mesquit, Lycium, Euphorbiaceous stuff, Bigelovia (same as Santa Rosalia). There is a long and coarse vine with big leaves and pink flowers, from a woody root, along the seashore, sometimes 20 to 30 feet long, growing flat on the ground and climbing over bushes but with no tendrils. Mesquit is common, also the same Lycium. A giant Cereus which must be Pringlei is common here, also the proliferous Opuntia, also Cereus gummosus and another like it, but larger and more erect. Mollugo, Pectis, Eragrostis, a bush with panicled flowers and white and translucent berry, very small flowers, with habit of Chilopsis, a palo verde same as at Hermosillo.

Triunfo. This place is about 40 miles south of La Paz and up in the hills near the top, 1,300 feet altitude. a great mining town in the past with an old smelter of great size. Here the vegetation is denser than below because of greater humidity.

San Antonio. This mining town is about five miles farther south and on the southern slope (going down toward the sea). November 9, 1926, 1,200 feet altitude. Lysiloma candida is very common here, Fouquieeria peninsularis, bottle-brush Cereus, also Cereus Pringlei, which is the largest of the cacti. This cactus is at once separable from C. giganteus and all other species by the flowers which come out mostly on the southern side of the stems, are 3-4 inches long, and very dark (almost black) purple on the outside, and pearly white within when open, and by the great burr formed by the mature ovary, which on the outside is a densely tangled mass of yellow spines which remains on the fruit. The Cereus Thurberi flowers I did not see, but the fruit is smooth, 2-3 inches in diameter, with red and juicy pulp and with remote and small black seeds, and is edible. Also there is the shellac tree (Bursera) with yellow bark flaking up, also the other species with pinnate leaves. Rhamnus California ? (Karwinskia) sometimes gets 15 feet high and with trunk 6 inches thick, with dark and rough bark. Lysiloma has smooth and

white bark almost the color of the aspen and glaucous, corymbose tops. The humidity must be high here, but soil is dry. Here grows Cardiospermum Halicacabum, have seen no Larrea. There is a prickly and erect shrub like Cerocarpus but leaves thin (Capparis ?). There is a yellow-spined flat Opuntia. I saw one narrow-leaved Agave (Goldmanni ?) on the other slope. There are two species of Yucca, one 2-10 feet high, with sessilinflorescence (probably australis). One is caespitose and fruit stalks 2-3 feet long, green leaves, no threads, much like Mohavensis but shorter. This was on the other slope too.

Near Triunfo. Vegetation much taller than at San Antonio. Now a place of 500 people more or less, but mine shut down. Agave Goldmanni ? with very slender stems 15 feet high by an inch wide, with racemes of few bunches of glaucous flowers. Leaves 14-30 inches long, 2-5 inches wide, with sharp black spines and an inch apart, on the margins are small and black calluses representing prickles, leaves dark-green and smooth, caespitose plants, growing about eight miles south of La Paz among the brush. There is a Prosopis-like shrub (Pithecollobium) with short and wide black pods. Nicotiana glauca, N. trigonophylla, Ambrosia (Franseria Ambrosioides), also the long-leaved shrub I called Franseria north of Hermosillo, which is an Encelia or Vigueria. Mangle on the spit but not on the mainland. There are the following Cereus, the big cardon, Pringlei branched below the middle, with 15 ribs, no fruit, then an intermediate species with few branches and a very budd-like fruit, reminds one of very big chestnut burrs, then there is the usual 13-ribbed species. There is also a caespitose and very low Cereus after the Engelmanni kind. All the above on November 13, 1926.

November 15, 1926, La Paz. Cultivated bush cotton, Gossypium Barbadense grows near hotel, and is perennial at least, also Tamarix, the feathery species (Italica). Tamarindus cultivated. Huamuchila, Pithecollobium boreale, sugar cane, the Climbing Asparagus, cultivated peppers, chili, tomatoes, beans, lettuce, sweet potatoes, dates, grapes, cocoanuts, roses, chrysanthemums, Zinnias, Helianthus annuus, Agave vexans in flower, Casuarina. Agave vexans has glaucous flowers, 3-10 in a cluster, perianth bell-shaped below and united half an inch up, then segements linear-acuminate and about ½ inch long, greenish or whitish, erect. Antheres light-chestnut, 1 inch long by 2 mm. wide, versatile, obtuse, straight, filaments, 3 times as long as peranth, purplish above as is the style and rounded stigma. Pedicels as long as wide, 2 mm. long, rarely 4 mm. long, pods elliptical and not at all contracted in middle when mature. There is a Cucurbit vine hanging from the low trees 10 feet high with oval, hollow red fruit, but when green is spotted green, climbing over a Bursera. There is a Porophyllum shrub, very slender and with filiform stems, 10 feet high, growing up among the brush. Lantana, an open shrub with habit of a labiate. Porophyllum has a strong odor. Examining the various Cardon cactus (Cereus Pringlei) I find the ribs vary from 11 to 13.

November 16-17, 1926. Had a high north wind for two days and nights. The cotton bush that grows here is about 5 feet high and widely

branched above. Today very hot and still. Boat due for Mazatlan today. There is here a Cereus like Emoryi, the same hight, but twice as slender, with yellow spines. There is another low one growing in mats, 1-2 feet diameter, the stems are 4-6 inches long. This is a Mamillaria probably. The big-burred pitayia, cardon (Cereus Pringlei) has intermediate forms that are smaller. The proliferous Opuntia is common, its fruit is almost always smooth and shiny. Then there is another, Tuna-like (cultivated), with joints about a foot long and nearly as wide, with each aureole with stout spines, probably fruit is edible. The real pitayia (of the Mexicans) is a low Cereus, that is, rarely over 8 feet high, with slender stems,. more more of the habit of C. Schottii, but fruit is globular, shiny all over, about 2 inches wide, red, a little depressed-globular, but the fruit I ate at San Antonio ovel and 3-4 inches long, dark-purple, and with black seeds ½ mm. long, four times as small as those of the burr-cardon (Cereus Pringlei). Some Mexicans say there is a big cardon with yellow and smooth fruit that stock eat. Saw a few Echinocacti (Falconeri ?). There is a big forest of the Cardon at the salt works at Pechilingue bay. The formation on the east of La Paz is tilted gently 10-15 degrees to the west, apparently close to the sea is seemingly Pleistocene, but above that eastward (below it geologically) is a black and reddish sandstone in immense areas like the Trias of Utah and may be Cretaceous, beyond that east are the high eruptive mountains, basaltic probably. The vegetation on the hills is little denser than at Tucson or Victorville, no grass. The higest mountains seem to have no more vegetation on them or, if any, a little less than below.

Left La Paz on the Washington for Mazatlan, and sailed all night over a placid sea. The purser says it is 220 miles across and that we will get there at night. Have seen a few birds, but no fish or whales. Now out of sight of land. Boat is making 10 miles an hour, am not seasick. Day mild and with few fleecy clouds.

Monday on train bound home out of Mazatlan. Forest still. Saw an Agave Goldmanni. Now I see a red parasite (Loranthus) on a Bursera, long flowers. Trees covered with Rochella lichen. Oceans of Leguminosate. Big apple-tree like Bursera but with simple leaves. Nowa tree 20 feet high with big and white flowers like a Cornus (Bombax Palmeri ?). Now a small petayia with 4 ribs. Now a bush (Leguminous) with long and yellow and erect spikes. Now a lax-leaved Yucca. Now we are down to tidewater. Dinner, quite a place. There are three ranges of mountains parallel to the east of us, 2,000 to 3,000 feet high, and a river 50 feet wide. Amarantus fimbriatus. Now a leguminous shrub with long and flat branches like a cocoanut leaf. Ipomoea purpurea. Now a tall weed like a Villanova. Now a tall and white-barked leguminous like a palo verde and with long and narrow pods. Now a big Aristida-like grass. Cardons still, 20-40 feet high. Now white and purple water lilies. Also Alisma or the like, Cuscuta, Hymenoclea. Vegetation large. Big leaves Leguminous plant with pods. Now an Agave near Vexans. Cypress with trunk 4-6 feet high. Purple water lily, Alisma. Some signs of rain. Yellow flowered small tree. Thou-

sands of crows. Now close to sea again. Baccharis viminea, erect Cereus 4-6 feet high with round stems and 6-8 ribs. Red flowered plant like an Asclepias subulata. Vegetation 10-15 feet high. Again the Cornus-like shrub. An Agave 20 feet high with leaves 3 feet long. Now a smooth and shiny Opuntia Tuna ? but joints 4-6 inches long. Lysiloma again. Olneya ? Now a river 150 feet across. Town of 1,000 people more or less. Cardon with burr-like fruit. Now I see a tall and white-barked almost leafless tree with the big and single white flowers (Bombax ?). Now the long-leaves Encelia. Much grass, recent rain. Vegetation dense, 10-15 feet high, 2 species of Cardon, one more slender and candelabrum-like (Thurberi). Conical hills, now a big-podded tree. Very much grass, 2 feet high. Close to sea. Many trees leafless. Ambrosia, no Fouquieria yet. Now an Echinocactus with few ribs, 2 feet high. Now an occasional Fouquieria peninsularis. Higher mountains to the east, Mile 298. Ambrosia very common now (this is probably Franseria ambrosioides), 3 feet high. Euphorbia flat on ground. A grass like Paspalum.

Francisco station. Brush 10 feet high, flat region on west. Many Leguminosae, but smaller. Cloudy. No Opuntias, Agave vexans. Everything in fruit. The slender Cereus (Thurberi) has a tapering tip, Pringlei is blunt at tip. Opuntia prolifera Echinocactus 2 species. Phoradendron on Leguminosae. Parkinsonia aculeata, gray-barked parasite is near Tillandsia, cardon. Vegetation is now 20 feet high. Long and high mountains 20-30 miles east, nearly parallel with us. Parkinsonia aculeata still, gray moss, mud hens. Smooth Opuntia 10 feet high. Very dark-green tree with apple top, Olneya ? or Capparis ? Clematis. Ceiba trees 30-40 feet high. Buzzards. Grapes. Yellow-spiked bush again 10-15 feet high.

Arroyo Chiquirita, Baccharis, cocoanuts, Franseria-leaved Encelia, Hymenoclea. Much cardon. Vegetation still 20 feet high. Lysiloma very common. Short-podded Cassia, 2-3 inches long pod and small flowers. Malvaceous bush 3-4 feet high. Water dirty as though it had rained recently. Corn 6 feet high, dry. Cardon. Above San Blas Sinaloa. Much wood, mesquit. Low region, with low and distant mountains, much ground visible among the vegetation, more like at Victorville but denser. Cardon like the burred one (Pringlei) but more slender. Leguminosae everywhere. No Fouquieria. Gray-barked shrub like Lysiloma but not it, palo verde, much Cereus Thurberi, some Pringlei, Dogwood tree (Bombax). Eupatorium 3 feet high. Grass less abundant. Kilometer 251, tapering cardon (Thurberi) everywhere. Bursera rare, Fouquieria more common, no true mesquit. Small Pedilanthus, flat Opuntia, like at Mazatlan, Echinocactus common. Vegetation 10-15 feet high now, Cylindropuntia very common. There is a tapering Cereus with very spiny burr. Mesquit, Cardon has a spherical burr, not the same as at La Paz (Pringlei). Corn, soil fine. Foggy. Shiny green and spiny flat Opuntias, also the leptocaulis species but 4-6 feet high, also the low petaiya. Kilometer 241. Yaqui station ? There is a tank here. Bottle-brush Cereus, palo verde, very much Cylindropuntias, also a flat one. No grass. Soil fine, flat country to the north and west. Cereus Pringlei has

a yellow-spined burr. Vegetation 10 feet high.

Masiaca station, a little place, some grass, mountains to the east, 2,000 to 3,000 feet high, 10 miles more or less. Mistletoe, Pedilanthus, mesquit. Vegetation 15 feet high. Fouquieria, much grass, big cardon with about 9 ribs, white-barked Luguminous tree. Cereus Thurberi is about 15-ribbed apparently here. Vines. Much flat Opuntias, also the Cylindopuntias. Fouquieria peninsularis very common, little grass| Mesquit very common, Cylindropuntias 2 species, one a slender one.. Vegetation 8 feet high. Much cylindopuntia, Bursera with smooth and dark and birch-like bark. Olneya. The big cardon (Pringlei) has flowers 3 inches long, no slender tube as in the petaiyas. Smooth and spineless Opuntia. Sea not far off to the west. Leguminous tree 1-2 feet diameter and 15-20 feet high, gray bark, not checked, not a Leguminous tree but a Capparis, evergreen, palo verde. Cereus Thurberi has 11-14 ribs, the small species has 5 ribs.

Bacavechi station. Small adobes. Many Leguminosae still. Asclepias subulata, long-leaved Encelia still common. Many farms, good soil, no irrigation, half of farms uncultivated. Amaranthus fimbriatus very common, Zizyphus, bottle-brush, cactus, much Cylindropuntia, much palo verde. Echinocactus with twisted ribs often leafless Bursera. Fouquieria bark very green to base, flakes up some. Vegetation very dry, all flat region. Kilometer 209, Mimosa. Good roads. Vegetation 8-10 feet high, mostly mesquit. Some palo verde, a few cactus. Much Boerhavia, also flat Euphorbias.

Navajoa, a big town, kilometer about 198. Mountains in the far east. Yaqui river 100 feet wide, ferrying an auto across. Corn fields, dates, bamboo, Tamarindus, Cleome Sonorae, Nicotana glauca, Baccharis viminea, flat and spineless. Opuntia, 2 species of Cardon, Cylindropuntia, Olneya, catsclaw of La Paz, vines. Vast and flat country. Fouquieria 4-6 feet high. Many Leguminosae. Grass. Now flat and Cylindropuntias like leptocaulis. Echinocactus with acutish tip, also Emoryi ? Cereus occasional. Now much Cylindropuntia with spines not yellow. Yellow-bark Bursera, leafless now. Many Leguminosae, very dry, much dry grass, Cardons scarce. Franseria ambrosioides, palo verde, mistletoe on Leguminosae. Vegetation 10 feet high and ground visible everywhere now, Bouteloua annuals and hirsuta, Ambrosia like Franseria, Krameria. Calliandra.

Cajeme, a large city in the flat region. Mostly mud houses but many fine places. Autos of many kinds. Low mountains to the north, volcanic Encelia, farinosa, Franseria ambrosioides very common, little of Cylindropuntias. A low species of Cereus 3-5 ribbed. Thurberi is scarce and singly and 3-6 feet high. Bottle-brush Cereus, Opuntia leptocaulis. Brush is all low now, 6-8 feet high. Agave Americana cultivated. Mountains near now on the east and low, cattle.

Esperanza station. Probably 500 people at the station, some soldiers, one with sandals. Quite a town of low huts. Low mesa-like hills 1,000 feet more or less high to the northwest and on the east. Corn. Here we take on a car of soldiers. Cucumber vine with spiny fruit and red on bushes, fruit 3 inches by 2, pointed, dry and not densely prickly, appar-

ently the same as grows at Mazatlan. Brush 15 feet high now, many vines (Cardiospermum ?), mesquit, Condalia. Big canal 30 feet wide, another vine with small leaves, not a Clematis, forming a blanket on bushes. Two cars of soldiers now in front, in steel flat cars. Alternanthera lanuginosa. Now a river with water 50 feet wide and bed 300 yards wide, acres of dense bushes 15 feet high, somewhat like Phragmites. Hymenoclea, cottonwoods (Fremonti ?). Good botanical region now. Cereus Thurberi. We probably have 300 soldiers on train now, three cars full and a lot on top. This is the Yaqui country now. Now a little town and a little fort on a hill. Much Encelia, Bursera, Cereus Pringlei, Mistletoe. Cereus Pringlei in flower. Brush 15 feet high. No Fouquieria for a long time. No Agaves. Aristida, a tall grass, Amarantus fimbriatus.

106 kilometers. Much Cylindropuntia 2 species, much like leptocaulis but large. Region is all flat to the southwest. Brush mostly 6 feet high now, scattered Cereus Pringlei, mostly low mesquit, flat Euphorbias now, still flat region on all sides. Low mountain off to the right (east). Now much Cereus Pringlei and Thurberi, Eragostis pilosa.

Bacam. Bottle-brush, much Cylindropuntia of 2 species, Olneya, Cucurbita, vine, Cereus Pringlei, Carphephorus junceus. Brush 15 feet high. Primitive soldier camp. Now a gigantic Cereus Pringlei, probably not giganteus, has more ribs.

Kilometer 89. Much big cardon. Basaltic mountains on the right close in.

Lencho station. Soldier camp here. Huts thatched with long grass. Station burnt. Fort of flat adobes close by. Big cardon most common now, with many wood-peckers. Brush 15 feet high up to 20 feet.

Vines. Seen no dog-wood tree for a long time (Bombax), Carphephorus junceus, bottle-brush, big cardon gone now. Long leaved Encelia, Buddleia or Hyptis, much low bottle-brush cactus 6-8 feet high, also a straggling Cereus. Many Leguminosae still, Cereus Thurberi still, now some of the big cardon, 2 species of Cylindropuntias.

Vicam. This is the capitol of the Yaqui region. A soldier camp too, the camp of the Yaquis along the track was burnt a year ago, soldier block house with a log parapet on the top.

We are now at the next stop north. Off the road to the west is another Yaqui town. Here is another soldier camp. They are putting up two circular adobe block houses here. In a dry wash I see an Echinodorus. Now a very slender leguminous plant, annual. Portulaca.

Kilometer 53. Andropogon saccharoides, 2 species of Cylindropuntia, a flat Opuntia, Parkinsonia aculeata, much grass. Country flat, brush low and scattered.

Kilometer 49. Rifle pits. All cactus present but Cereus Pringlei, Alternanther lanuginosa, Jatropha canscens, Atriplex canescens.

Another army camp with rifle pits 300 yards long. Shrubby Suaeda. Brush low, 10 feet more or less high. Bigelovia. Baccharis viminea. Soldiers patrolling track. Setaria glauca, Andropogon saccharoides. Soil rather alkaline now. Big cardon.

Kilometer 41. All cacti present, Agave vexans.

Peon, another army camp, circular rifle trench around station, full of houses or rather huts 4-6 feet high. Bigelovia, Amarantus fimbriatus, Cardiospermum. All cacti still, Aplopappus gracilis, Erigeron like flagellaris but taller, Cyperus. A woolly long grass spike, Muhlenbergia debilis, Bouteloua annual. Now among volcanic hills, a long-spiked Sporobolus, Prosopis Atriplex, cardons, bottle-brush, Franseria ambrosioides, now some big cardons. Brush 10 feet high. Big cardons common now. Black basalt on the west. Larrea common.

Kilometer 25. Now at a village where Yaquis years ago massacred a whole train load of people. Crosses mark the place. A windmill and cottonwoods.

Piedra. Kilometer 23. Now a low, blue, and round flat Opuntia, shiny. Now lava in tiers. Rifle pits. Tribulus, Argythamnia, Sida, Physalis, Cleome Sonorae ? Larrea everywhere, big cardon.

Ortiz. November 23, 1926. Just saw a dog walking on two feet, one front, one back. Soldiers still on train. This is a camp with many soldiers. Cloudy and cool. Dates. Saw some helmet hats. Houses mostly with bamboo rods and dirt roofs and floors and mostly one room. Tables of boards and oil cloth. Most of the women with stockings and shoes. The soldier camp is on the edge of the town. Asclepias subulata, Encelia cordifolia, Argemone Mexicana, Nicotiana trigononhylla, Pectis angustifolia ? Allionia incarnata. Long-leaved Encelia, Carphephorus junceus, a shrub with flat and reddish pod like a Prosopis, palo verde, also Parkinsonia aculeata, Hymenoclea, mesquit, Cardiospermum. Hyptis Emoryi, bottle-brush cactus, Martynia, slender catsclaw (Mimosa). Ipomoea, Jatropha canescens, Cylindropuntia but fruit larger than usual. Saw a hawk with a white collar. Capparis. Bursera with yellow bark. Now the Sonora river. Cereus Thurberi, Pringlei probably, also Olneya, Cardiospermum, mistletoe. Brush now 2-6 feet high. Much low Acacia, palo verde. No grass. Later some grass. Bursera, Olneya, Encelia cordifalia. Much Fouquieria, Franseria ambrosioides.

Moreno. Ipomoea with blue flowers and small leaves. Martynia shrubby and not dense, Cardiospermum, 2 species of Cylindropuntia. mesquit. No Larrea, palo verde, Bursera. Agave vexans. Low hills with Lysiloma on the sides. Amarantus fimbriatus. Ranges of mountains on both sides now, 10-15 miles off. Brush 10 feet high. Much less cactus. Low hill on east with palo blanco (Lysiloma). Much grass, mesquit, palo verde, Zizyphus, bottle-brush.

Tores station, 26 miles from Hermosillo. Argemone Mexicana. Limestone hill on the west. Philibertia, bottle-brush with 5 ribs, Cereus Thurberi, Olneya. Little grass. Encelia cordifolia. More grass. Shrubbery 10-15 feet high, bottle-brush grows in tufts. Now low and conical hills all around in the distance. Typha angustifolia, Bamboo, Cenchrus tribuloides, long-leaved Encelia. Sorgum Halapense, Bamboo. A low and spreading bush or herb with heads of yellow flowers, and fruit with wings wider than in Abronia. Xanthium strumarium, sugar cane, Physalis, Big Tuna, yellow oranges, Clematis, small leaved Rumex, dates.

Parkinsonia aculeata. There is a limestone hill all covered with Cereus Thurberi bottle-brush, Wislizenia Cardiospermum, Hymenoclea, Encelia cordifolia, very much long-leaved Encelia, Zizyphus, mesquit, Olneya, catsclaw. Very dry here. Large Cylindropuntia, Allionia, incarnata, Hilaria mutica, low and very narrow leaved Bouteloua, Jatropha canescens.

Pesquiera station. Scattered Leguminosae, Encelia cordifolia very common, catsclaw, Opuntia leptocaulis, long-leaved Encelia, bottle-brush, another low Cereus like maritimus, Cereus Thurberi, Olneya, Prosopis, Philbertia linearis, Franseria ambrosioides. Country has been washed with water at least 10 feet deep, Allionia incarnatæ, Amarantus fimbriatus. Brush now 20 feet high, Capparis, palo verde, Lycium, screw bean, Hymenoclea. River here was ¼ mile wide at flood. Datura Stramonium, Alternanthera languinosa, Zizyphus, bottle-brush, Condalia, catsclaw, screw bean. Mistletoe, Cereus Thurberi becoming rare, also Fouquieria. Much grass Bursera with brown bark, 2 species of Encelia. Opuntia Bigelovii, Cereus maritimus ? Zizyphus, Cardiospermum, Condalia 15 feet high. Boerhaavia annual, blue Ipomoea, Castor oil plant. No mountains near. Oleander, Nicotiana trigonophylla, Villanova chrysanthemoides.

Carbo. Alternanthera lanuginosa and Encelia cordifolia most common now. Hymenoclea. Whole valley nearly level, vegetation rather dense and 20 feet high. Mostly Leguminosae, Baccharis, sergilioides, Wislizenia. Populus Fremonti.

Pozo. Everywhere here the housese are collapsed. Some canes of Fouquieria splendens on a fence, Baccharis sergiloides, Lycium, Hymenoclea in long spikes, Physalis, flat Euphorbias, big flat Tribulus, Ipomoea pink-blue, medium sized. Mistletoe, Amarantus fimbriatus, Franseria ambosiodes, Cereus giganteus ? Cottea, Bouteloua prostrata, Aristida gracilis ? Malva, Setaria glüca. No Larrea, palo verde. Vegetation very green.

Camon. Everything as dry as a chip.

North from Magdalena, November 24, 1926. Sambucus glauca in bloom, a tree 20 feet high here. Celtis, Mesquit, some trees 40 feet high and 2 feet diameter, Juglans, Populis Fremonto, Hymenoclea, Krameria. Baccharis sergilioides, Salix amygdaloides, Zizyphus, Atriplex canescens, Cotton.

Nogales, January 23, 1927. Saw Yucca elata ? on the way from Tucson. It has the habit of Whipplei, but has a trunk 4-6 feet high. Leaves more like those of Y. angustissima but wider. Inflorenscence that of Whipplei. Flower peduncle 2-4 feet long.

January 24, 1927. Frost on the ties and car tops at 7 a.m. Barometer reads 3,600 feet altitude. The divide south reads 3,900 feet. Nearly all the way south over the divide from Nogales we are among live oaks (a black oak). It is bright and sunny, but frosty. The first stop is 3,500 feet altitude, where there is a broad meadow and small pond. Saw a camp under a live oak, with a bright fire burning, and a wagon near by. Passed a fruit express train of 14 cars bound north at the summit. Much wood piled high, also many burros grazing. No pinons or junipers, some Celtis occidentalis, Juglans Californica with mistletoe, now a decidu-

ous oak ? Now an ash with a mistletoe, Chilopsis, Celtis, live oaks getting less. Second stop, Populus getting red from the male catkins. Still signs of frost on ground, Salix amygdaloides, Trixis in bloom, Platanus. Live oaks went out at about 3,000 feet altitude. Now 2,700 feet altitude. Brush getting green. Sambucus all green. Turtle doves. Populus in full flower. Grain starting. A big mesquit 40 feet high and 2 feet diameter.

Magdalena. Much salix amygdaloides. Flocks of blackbirds. Trixis under the willows. Eucalyptus cultivated. Now crossing a stream of about 10 second feet. Water cress. Big Tuna 10-15 feet high, cultivated. Oranges, olives. Nicotiana glauca. Quince trees. Olive trees loaded. Much cardon (Cereus Pringlei ?) and bottle-brush opposite Magdalena. We now have just passed Magdalena. Trixis angustifolia, Sambucus is really an evergreen. Have not seen Larrea yet but the flora is Tropical. Bananas and figs. Castor oil bushes. Peas in bloom, Ash (Fraxinus) in bloom. Helianthus annuus 10 feet high.

Lorazo, a little station. Larrea. Santana station. Cotton gin. Now a low town by the river on the open plain, Yermo. Quite a town. Low volcanic hills on the west.

Loria station. Low mountains on the west, mines. Brush scattered, much grass.

Carbo. Grain six inches high, long-leaved Encelia, Sphaeralcea angustifolia in bloom. Encelia cordifolia in bloom. Here is where we see the first Fouquieria peninsularis. F. splendens is common from the north to Magdalena. Bursera (copal) here.

Hermosillo. Saw the first big dogwood flowered tree about 20 miles north of here. Wheat in head here. They have had some rain lately.

3 p.m. Kilometer 280, south of Nogales. Warm and dry. Populus leaves still partly on.

Guaymas. Botanized on the hills north today (January 25, 1927). Vegetation very dry. Got very little. Still and warm.

Guaymas, January 26, 1927. Hired a launch to take me over to the mouth of the bay. Got many plants there on the islands. Giant cardon (Cereus Pringlei) in a forest on the east end of island near mouth. Saw four masses of them on the north end of the island, where the navy yard is. Saw no ferns. The Cereus Thurberi is larger here. The flowers of C. Pringlei are short and not much expanded. The form on the island has branches near the base or even often at the base. Saw also several Echinocactus with yellow and smooth fruit and no wool, with spines but little flattened and straight or hooked, plants 2-6 feet high, a foot or more thick, ribs not spiral, has no small lateral spines to speak of. There is also a Mamillaria here, common, and is rarely 6 inches high.

Near Vicam, January 27, 1927. Cerus Pringlei varies considerably, and some forms appear to resemble C. giganteus somewhat, but the two can always be separated by the greenish-white flowers and smooth pods of giganteus, and the black-purple flowers and great burrs of fruit of Pringlei.

Oroz station. Here they are erecting a square fort with circular

block house, 10 feet high on the corners. Cereus Thurberi, much mesquit. There is one plastered house here, and two tie houses with two soldiers on top, one oblong fort made of adobes with arched corners and salients, brush cut o... around. One woman smoking. Physalis lobata covering the ground and making it seem blue from the many flowers. Encelia fruescens ? Opuntia prolifera, also shiny one like leptocaulis but thick. Tall Lantana, Cereus giganteus ? C. Pringlei, C. Thurberi.

Another soldier camp. The soldiers are armed with our old U. S. army Springfield rifles or their successor, the bolt rifle. Houses covered with grass thatch and then two inches of mud. One small round block house going up. Much Franseria ambrosioides. Mimosa in bloom and with strong odor. Cactus scattered now.

Cajeme. More flowers. Nights at Guaymas were cold. Mistletoe on Leguminosae. Eleveation only a little above the sea. Barometer reads 600 feet. Humidity 63%. Brush scanty, 4-6 feet high. Much grass. Low volcanic hills near at the east. Some Lysiloma candida on crests. Now past the hills on a vast plain. Brush 10 feet high. Big plantation of Agaves on the right.

Vilderrain station. Still flat country and brush scattered.

Fundicion station. A few houses. Ground purple with Physalis. Legumniosae 10 feet high, and a little thicker on ground, mostly mesquit and Mimosa. No Larrea. Cereus Pringlei frequent, also Thurberi. Patches of Opuntia prolifera species, some straggling petaiyas. Prosopis ( ) with tufted and slender stems 20 feet high and mottled-gray bark and common. No Bursera, no Fouquieria. Leguminous shrub with short and broad pods and leaves like Eriodictyon tomentosum, 20 feet high.

Navahoa. Big river here, 150 feet wide. Dates. Cottonwoods. Tomatoes a foot high. Tamarinds, castor oil plants, grass on the hills a foot high. Mountains some 15 miles to the east, two ranges. Brick kiln, factory. Big town. Residence of Obregon. 3 p.m. Getting warm. Devil grass green on ground. 1,200 feet altitude. Children with pails of peas. Fouquieria peninsularis again, along with much cactus, but no Cereus giganteus. No main trunk to Fouquieria here, but stems twisted as in this species. Only one tree species scattered over the plain; this seems to be a Capparis. Saw an Agave vexans. High mountains 30-50 miles eastward. Palo verde. More ranches. Nicotiana glauca. Long-leaved Encelia.

Masiaca station. Vegetation 15 feet high, mostly Leguminosae. Much Cereus Pringlei and Thurberi, no C. giganteus, Fouquieria. Ranch. Peas a foot and a half high in bloom. Still flat region. Bursera leafless still. Tufted Prosopis (?).

Luis station. Still in the flat region but more rolling. Much Cereus Pringlei Cornel-tree, leafless but common now (this is Bombax). Brush 15-20 feet high. Opuntia prolifera species. Echinocactus. Just saw a magnificent red-flowered tree in full bloom and becoming frequent as we move south. Bigger trees now, whole tree a mass of red or purple like Bouganivillia.

San Blas Sinaloa. January 28. Went out and got a big collection

Parkinsonia aculeata. There is a limestone hill all covered with Cereus Thurberi bottle-brush, Wislizenia Cardiospermum, Hymenoclea, Encelia cordifolia, very much long-leaved Encelia, Zizyphus, mesquit, Olneya, catsclaw. Very dry here. Large Cylindropuntia, Allionia, incarnata, Hilaria mutica, low and very narrow leaved Bouteloua, Jatropha canescens.

Pesquiera station. Scattered Leguminosae, Encelia cordifolia very common, catsclaw, Opuntia leptocaulis, long-leaved Encelia, bottle-brush, another low Cereus like maritimus, Cereus Thurberi, Olneya, Prosopis, Philbertia linearis, Franseria ambrosioides. Country has been washed with water at least 10 feet deep, Allionia incarnatæ, Amarantus fimbriatus. Brush now 20 feet high, Capparis, palo verde, Lycium, screw bean, Hymenoclea. River here was ¼ mile wide at flood. Datura Stramonium, Alternanthera languinosa, Zizyphus, bottle-brush, Condalia, catsclaw, screw bean. Mistletoe, Cereus Thurberi becoming rare, also Fouquieria. Much grass Bursera with brown bark, 2 species of Encelia. Opuntia Bigelovii, Cereus maritimus ? Zizyphus, Cardiospermum, Condalia 15 feet high. Boerhaavia annual, blue Ipomoea, Castor oil plant. No mountains near. Oleander, Nicotiana trigonophylla, Villanova chrysanthemoides.

Carbo. Alternanthera lanuginosa and Encelia cordifolia most common now. Hymenoclea. Whole valley nearly level, vegetation rather dense and 20 feet high. Mostly Leguminosae, Baccharis, sergilioides, Wislizenia. Populus Fremonti.

Pozo. Everywhere here the housese are collapsed. Some canes of Fouquieria splendens on a fence, Baccharis sergiloides, Lycium, Hymenoclea in long spikes, Physalis, flat Euphorbias, big flat Tribulus, Ipomoea pink-blue, medium sized. Mistletoe, Amarantus fimbriatus, Franseria ambosiodes, Cereus giganteus ? Cottea, Bouteloua prostrata, Aristida gracilis ? Malva, Setaria gluca. No Larrea, palo verde. Vegetation very green.

Camon. Everything as dry as a chip.

North from Magdalena, November 24, 1926. Sambucus glauca in bloom, a tree 20 feet high here. Celtis, Mesquit, some trees 40 feet high and 2 feet diameter, Juglans, Populis Fremonto, Hymenoclea, Krameria. Baccharis sergilioides, Salix amygdaloides, Zizyphus, Atriplex canescens, Cotton.

Nogales, January 23, 1927. Saw Yucca elata ? on the way from Tucson. It has the habit of Whipplei, but has a trunk 4-6 feet high. Leaves more like those of Y. angustissima but wider. Inflorenscence that of Whipplei. Flower peduncle 2-4 feet long.

January 24, 1927. Frost on the ties and car tops at 7 a.m. Barometer reads 3,600 feet altitude. The divide south reads 3,900 feet. Nearly all the way south over the divide from Nogales we are among live oaks (a black oak). It is bright and sunny, but frosty. The first stop is 3,500 feet altitude, where there is a broad meadow and small pond. Saw a camp under a live oak, with a bright fire burning, and a wagon near by. Passed a fruit express train of 14 cars bound north at the summit. Much wood piled high, also many burros grazing. No pinons or junipers, some Celtis occidentalis, Juglans Californica with mistletoe, now a decidu-

shrubs. Saw several Cereus Pringlei with branches nearly a foot in diameter and 15 long, with whiskers on the end. It had some typical flowers.

February 2, went northeast to the mountains. Brush very thick, same in kind as everywhere. Much Cereus Pringlei. Saw a Pedilanthus with thorns clear to the ground climbing over a bush. There were yellow joints full of seed, no flowers. Had long and leafy branches and fine and deciduous black needles. Stem 2 inches in diameter. Cereus Pringlei has most of the flowers on the south side, facing the sun. Northeast of San Blas there are larger masses of trees, 20-30 feet high and with the spines developed into whiskers as in the bottle-brush but spines not so long. No other difference in the plants. Saw some of the Guaymas Mamillaria, also Echinocactus Falconeri. Saw also Cereus Schottii (?) a straggling petaiya which sometimes develops aerial roots. Much Opuntia prolifera species, also the tall leptocaulis species, with fruit triangular in outline, smooth or spiny, with leaves an inch long and very prominent on young shoots, no flowers yet.

February 3, 1927. Botanized on the river. The cottonwood (dimorpha) is a big tree, 75 feet high, with spreading habit of angustifolia but not with the dying old branches so common in that species. Bark is gray and rough as usual in the genus. Male catkins all green, not at all red. Female ones very slender. Leaves on lower shoots inclined to be linear and serrate at first, the later ones are rhombodial and acuminate. Plant is much infested with a parasite. The old leaves fall as the new ones come on. Trees never bare. Scales of first catkins brown. Stamens always yellow.

February 5, 1927. Below Culiacan. Now in oceans of the graceful Lysiloma candida-like shrub with mottled-gray bark, and tree 20 feet high. More flowers out now. Cassia shrub of San Blas common. Cactus gone, but some Cereus Pringlei. Parkinsonia aculeata occurred at San Blas on the bottoms. Sky clear. Very moist. Some cattle. No grass. More Cereus Thurberi. Here is a ditch full of Azolla (?) Rochella lichen on the bushes. Bombax still. Agave Goldmani occasional.

Olate station. Now near the sea. Brush lower, but has been as high as the telegraph poles. Now close to the breakers. Here is a low bottle-brush with 3-5 ribs, also the usual Cereus Schottii. Brush lower. Mangle. Road skirts the sea for miles. White thunder clouds. Mountains east of us now.

Modesto station. Much Argemone alba. Some big trees. A peculiar Rhamnaceous shrub with branches like a frond of a fern, 10-15 feet long Clematis.

Mazatlan. Everything very dry. Clear and warm. Cocoanuts about ripe.

Now out of Mazatlan going south. Saw on a wet flat what must be Echinodorus. Shrubs about 10 feet high, the cornel-like one 20 feet. Cereus Pringlei, now a 4-ribbed cereus. Mimosa, Agave vexans. Very much Bombax and a yellow flowered species too, for the first time, flowers 2-3 inches wide. Cereus Pringlei, 9-ribbed. Much Jatropha canescens. Hoffmanseggia pallida. Some flat Opuntias. Bullrush. Much thorny

brush without leaves. Tall grass. Amole. Much dead grass. Brush now 20 feet high. Tillandsia, with long and red flowers. The amole has red leaves. Corn is tassled out, near by is more only a foot high, some 6 feet high. Now a town with a cathedral on the left. Baccharis viminea. Very much long-leaved Encelia. Vines many. Bananas. Cattle. Tall Malvaviscus herb 6-8 feet high with very small flowers. Now the frond-like shrub again. Now girls with 6 foot long stalks of sugar cane. Narrow-leaves Lycium Mimosa same as at Nogales. Now another very broad leaved Mimosa. Yellow Lantana. Now see Mexicans with machetes. Now a six-mule team, four in front abreast. Train left Mazatlan about 5:15 p.m. Now sundown and getting dark, near sea level. Brush.

February 8, 1927. Tepic. This is in the hills, 3,000 feet altitude, and with hills 2,000-3,000 feet higher around it, grassed over and with scattered trees on them. Gulches dense with brush or timber. Sod everywhere. The bottoms of gulches are mostly narrow and moist, Adiantum species on side walls on north slopes, also Selaginella and some Notholaena sinuata and another species. Gulches have a rigid Polypodium and Aspidium (long fronds over 2 feet long), also weak annuals such as Lobelia, Drymaria, labiates, etc. A big and shrubby Senecio, 10-15 feet high. Some Cucurbita species. Grass seems to be some Devil grass on drier places and a broad-leaved Cyperus, also a tall bunch grass 3-4 feet high, now mostly out of fruit. Some Tillandsia. Saw a vine with a big 3-cornered fruit 3-4 inches long. Now a Eupatorium shrub, a Brickellia. Strawberries ripe. They sell strips of fresh cocoanut meat for a cent each (centavo), also a round berry about the size of a gooseberry, may be Sapindus. So far I see no cactus.

February 10, 1927. Tepic. Saw a few flat Opuntias yesterday, also some Yucca australis, no Petaya cactus nor Mamillarias. Some of the trees have ash-like leaves and bark like the oak but neither flower nor fruit. There is a deep cut made by a runoff ditch from a ranch near by that is 50 feet deep and 4 feet wide and mostly with vertical walls. 2 miles long, full of ferns and moss and Marchantia, Polypodium, Adiantum 2 species, Aspidium, Notholaena, Gymnogramma, also mints and Schrophs, Verbenaceae and some Compositae, Solanum, Lobelia. Soil is heavily sodded and wears only in the cuts where it is a fine and unconsolidated volcanic conglomerate. No running water nor signs of irrigation. Have many deep wells and pull up water by ropes. Have seen no windmills. Water is good. They have a water system and electric lights, but no gas nor stoves in town so far as I can see. Streets are paved with rounded or flattened cobblestones, and are worn concave in cuts. Walls of streets are of cement and 1-2 feet high, and narrow (sidewalks). Streets narrow but straight mostly. Big cathedral. Big plazas full of flowers and trees, cocoanuts, bananas, etc.

Tepic, February 11, 1927. Went out toward the river on the railroad bridge. Got a big bundle of stuff. Got in a swamp full of peculiar Phragmites (?) like grass, and had to walk half a mile in water up to my knees. Got some interesting things, such as Azolla, and Marsilea. The ground everywhere wet and soggy. Trapa everywhere in the water.

Cattle eat it, spans the river in one place, 30 to 50 feet wide. River rather deep, slow and opalescent. Much frog-spittle.

February 12, 1927. Went across the railroad bridge and botanized on the bluff near by. Rained a fine drizzle all day. Toward evening the streets running with streams of dirty water. Cold and raw. Had to go to bed at 4 p.m. to get warm. Every drier full and then some. Have not yet reached to base of the mountains.

February 13, 1927. Spent most of the day drying driers: slow work because of clouds. People here are usually intelligent. Lowest class, both sexes go without shoes or stockings and are dirty, but upper class dress like home folks. All women and girls seem to wear tight drawers and have skirt separate from waist, no caps nor bonnets. Many street vendors on the corners and balconies or on covered ways (verandas). They have a tortilla-grinding mill here. See many women with bowls full of dough. There are two big coquita trees in the Plaza (Attalia cohun). They are 75 feet high, straight as a die, and with immense leaves and long spikes of fruit. Streets narrow. It is a place of 10,000 people. Soliders at state house. Governor was deposed the other day, and no one seemed to care. Rained hard for a short time.

Tepic, February 14, 1927. Went south to the foot of the mountain, but got loaded up so that I had to turn back. Got poisoned by Ivy. Saw a third species of Adiantum today. Got one big tree. It is amazing how many species there are as I work over the ground, and am not yet up to the mountain.

Tepic, February 15, 1927. Took a third trip to the south mountain and got up about 500 feet to the pines when I was loaded down again. Grass in places 6 feet high, a Bealea ( ), also Bromus, Aristida, Phragmites-like species, some Bouteloua hirsuta, Mints, Compositae, some Adiantum in the open. A tree with oval and woolly leaves and Martyniaceous flowers. Damp canons with a great leaved shrub with masses of red berries and stinging hairs. Found two species of Polypodium growing on a tree. Got several new ferns, one Adiantum 5 feet high by 3 feet wide. Saw the usual one two feet high growing from a cliff. Saw an ant nest that looked like a double handful of cow dung plastered on a tree 10 feet above the ground. Was full of black ants that fought like fury and stung hard. Hillsides a solid mass of plants, Grasses, Linum, Lobelia, mints, Leguminosae, Erythraea, ferns, also a Pteris. Got a tall Leguminous plant with habit of a mint. Selaginella in all canons and also Marchantia, and some small mosses. There is a Hyptis like mint in full bloom, and also a big red Lobelia. Got very tired lugging my load home. The day's collection made a pile all that a set of straps could hold. Weather clear and cool. Humidity very high all the time, heavy dew every night. Ocean haze all the time. Ocean 40 miles off to the west.

February 16, 1927. Went toward the depot today and got a Castilleia like ours at home. Got a Lepidium and Ipomoea on a wall. Weather mild. Humidity all day 85%. The coquita trees in the park are about 75 feet high and 2 feet diameter, leaf sheaths about 6 feet long and per-

sistent, differing from the deciduous cocoanuts, and do not turn down until ready to fall off. Fruit cluster about 2 feet long, fruits about as big as unshucked walnuts. The oak wood they sell here for fuel is 4-6 inches thick, heavy and close-grained, and slivers on splitting, is dark in color. Their leather made from native oak tanning is good and they make many sandals.

February 17, 1927. Got on train and all ready to start at 1:30 p.m. bound for Ixtlan. Nothing but construction trains east of here. Had to wait half a day for train from the north, then no first class car on train. Sugar cane 6-7 feet high, ready to cut, old fruit in a panicle but seldom seen. Grassy plain with black soil. Helianthus. Going east. Large cattle, many. Now in rough country with oak forests, a small river below. Then we cross river on a high trestle. Now out on a grassy plain with vegetation like that of the old Iowa prairies. This is at second station out of Tepic. Two ponds of water. We are now lower down than Tepic. Trapa in the water, Bullrushes, Crotalaria herb in fields. Narrow-leaved willows. Cereus Pringlei or a species like it but more branches and with fewer ribs (7-9). Now more arid and less grass. Tuna, yellow-flowered tree with big flowers like the cornel in habit. Much tuna-like Opuntia 5-10 feet high. Road now very twisty. Terra-Pelon (sounds like this) station. Cereus Pringlei (?) with trunks tapering as in Thurberi and as many, in full flower. Much drier now, grass short. Country getting rough again. Saw an herb which seems to be full of big globose and racemose pods. Bursera with brown bark, but leafless. Very much flat Opuntia tuna, and about the size of the Cardon. Forests in the gulches, the rest grassed over. See some trees in the distance that may be Cupressus or Juniperus.

Conde station. Large fields of Agaves planted. See an occasional Cereus Thurberi, and two species of bottle-brush cactus. Grass looks like winter, as if it had been frosted. Altitude still below that of Tepec as shown by barometer. Tall brush 10-20 feet high, may be a Fouquieria but has yellow apple on it (probably Crescentia alata).

Titiklan station. Corn in tassel. Watermelons. 3,500 feet altitude.

Ahuacatlan station. Yellow-flowered bush a mile or so below on the north on lava. Saw red flowered Asclepias in field. Argemone alba common. Datura Stramonium, Nicotiana glauca is common all through Mexico. Washingtonia Sonorae is cultivated here. More Tuna, 30 feet high, with trunk over a foot thick, the flowers seem to be light-purple, surface of joints is smooth and shining and dark-green, variably spiny.

Ixtlan. Streets are paved like Tepic. Can't be more rainfall than 20 inches. Trails are very old, 10-15 feet wide, usually with 4 paths parallel. Few roads suitable for autos or carts. Autos in town. All hauling on trails is by oxen dragging lumber or logs, or by burros packing merchandise, firewood, charcoal or forage. Trails near town fenced in by stone walls. Rock is all eruptive mostly basalt. They have for sale here on the market a black colored physalis, also many kinds of peppers. They cultivate a Crotalaria. There is a male date palm in the plaza 50 feet high, no others. Bananas are raised here for the market, sugar cane,

turnips, fine lettuce, tomatoes, potatoes and sweet potatoes, peanuts. They have oak wood for fuel and charcoal. They have many player pianoes and phonographs here.

February 20, 1927, all packed and on train for La Barranca. Hot today. Barranca is a little place with shanties and not conveniences. Got a kind of a place to stop. Very dry and hot here, more so than at Ixtlan. Altitude about 4,000 feet. Hills around are about 1,000 to 2,000 feet high and rather flat-topped, covered with pine and oak woods, all grassed over, grass short. Volcanic soil. Erosion great. The barranca is to the east and south and is 1,000 to 2,000 feet deep and covered with vegetation, a kind of native bamboo 20 feet high, but there is other tall grass 3-5 feet high in bunches. Very much Tuna of big trees 30 feet more or less high, with shiny and dark-green bark. There are some Cereus Pringlei and Thurberi. In the canons is a Mamillaria about 6 inches high, single or tufted, broad at tip and no hooks. Tuna will soon be in bloom. Scattered Bursera with dark-brown bark is the more common, but the light-gray barked one also occurs and has a mistletoe on it (Loranthus). The Cornel-like tree has what seems to be a true Rhododendron on it. The Martyniaceous tree with big spines on the old trunk has a cucumber-like fruit bearing cottony seeds. So it is a Bombax. Mesquit, Nogales Mimosa (biuncifera ?). Many trees are like the rubber tree with shiny and big leaves (Ficus). Bananas grow well here, also sugar cane, oranges,, lemons. There is a small native blue palm in the canons without threads on the leaves, which are 1.5 feet long, and with small trunk. There is a Yucca (australis ?). There is a red leaved Agave. The 3-cornered Cereus (Schottii ?) on cliffs, also one on trees, also a Pedilanthus. Very hot and dry here. Some yellow-flowered Cornel-like trees. Bursera is leafless and starting to flower. Half a dozen species of ferns, 3 Adiatums, 1 Polypodium, Aneimia Mexicana, Aspidium (a large one), 3 species of Selaginella, one is lepidophylla. At the springs in the barranca is a Juncus like Balticus, a Cyperus, a Paspalum, several lichens, and 3-4 epiphytic orchids, Tillandsia but none in bloom. Trees are rarely 20 feet high except in gulches, oaks on slopes 20 feet with big leaves, no fruit.

February 23, 1927. Left barranca in the evening and got to Tepic at 10 p.m. Next day started for Acaponeta. Weather clear. Baccharis viminea. Much yellow composit (Eupatorium ?). Trapa. Echinodorus in water as we cross the river. Red Agave (may be amole). Cane fields, Nogales Mimosa. Much reed-like grass on river, Trixis. Big fig trees. Low white flowered Mimosa. Grass everywhere. A little lake with opalescent water which may be due to soap (women washing in it). Now at a deep draw full of brush. More shrubbery coming in like Tepic stuff. Red Lantana, Convolvulus or Impomoea. Much ocean haze, Encelia. Cane 8 feet high. Now in brush 20 feet high. Now a beautiful bush in full flower like a red bud (Cercis). Grassy slopes, Cornel tree.

Labos. Women with soap on bushes. Red bud in leaf, springs, grass, sugar cane. Red soil. Hauling cane with 6 mules, two behind

and four in front abreast.

Imla. Like a camp. Soil seems very porous and spongy. Station, did not get name. Wide and smooth road. Cane fields, some of them burnt over. Low hills, wide mesas, all grassed over. Mexicans are great lovers of flowers and music. Salix Bonplandiana. More cane fields. Elms or like them, also resembles Corylus. Soil very red. Grass 3-4 feet high. Deep-red flowered bush with big flowers. Reddish water. Railroad equipment good but poorly handled. More grass, tall, much Andropogon. Bombax. Mountains high over at the north. Red leaved tree. Deep barrancas. Bamboo. Solanum bush 8 feet high. A leguminous bush with flat pods 6 inches long. Tall grass. Nuches station. Irrigation ditches. Oak-like bush, a black oak (?). More barranca 200 feet deep, all volcanic. Red-flowered bush again. Air getting far more humid. Tall bamboo grass in flower now. The yellow-flowered tree has a big ovate or oval fruit 3-4 inches long. Very rugged now, big bridge. Oblong-podded Leguminous shrub. Much Andropogon. Station, did not get name. More barranca, Erythea, cultivated Washingtonia Sonorae, velvety-red-flowered tree. Good roads. More Erythea or Washingtonia, Cardiospermum. More palms with very slender trunk. Oaks. Kilometer 1,052. Much oak brush. Much palm in flower. Fern-branched Rhamnaceous shrub. Some big trees, everywhere brush. Station, did not get name. Pectis-like tall herb. Big red-flowered orchid in tree. Big grass or Yucca-like, soft leaves. All forest except here and there a grassy park. Trees hanging with vines. Very rugged region. Palms all along. Now along river, more open. Station, did not get name. River 20 feet wide. Cuscuta on tree. Kilometer 1,020. Just saw a big tree with a palm growing in the center and almost dead. Down by the river, the water is 500 feet wide and slow. More grass and trees. Yellow-flowered cornel-like tree more common. Wild oats. Tunnel. The trees that look like dates may be coquitas. Erythea in full flower. Kilometer, 1,013. Palms everywhere, the chief trees. Grass, few bushes. Now night and cannot see vegetation.

Acaponeta. Stopped at Sud Pacifico hotel by depot. Low hills all around and apparently all wooded. The Pumpkin tree Crescentia alata is cultivated here. The fruit is round and green till ripe, and 4 inches diameter. The leaves have winged rachis, and the flowers are nearly black and come out from the main trunk of the tree. Went out to the hill west and got a lot of shrubs. There is a yellow-flowered Bombax tree here.

Friday went again to the hill and got a smaller load. Very hot and dry. The bark of the Bombax is soft and the wood very brittle, leafless now, branches few and long and smooth, gray like the figs. The other yellow-flowered species has much the same bark but branches shorter and more slender. Then there is a clothespin bush, fruit like a clothespin. Tree 20 feet or more high and no leaves now. Then there is a woody vine, leafless now, with enormous flat and thin pods a foot long and 3 inches wide and 1-2 mm. thick. Then there is a shrub 10-15 feet high whose branches become vines and twine at the tip; the flowers are bril-

liant-orange, linear, in masses on one side of a rachis, and can be seen for miles. Bark is smooth and gray, trunks 6 inches diameter. Did not see fruit. There is the 3-cornered Cereus, also Cereus Pringlei, and the flat Opuntia. No wild palms here so far. Red Agave is common. Saw one Lygodium fern not in fruit. There is a Ludwigia with evanescent flowers, petals an inch long and yellow. Many vines here. Many thorny trees and brush. No catsclaw. Manzanillo Mimosa common and with the little black ants in the enlarged stipules, whose bite stings for a long time. There is a tree with soft leaves, it is about 20 feet high, that has pods 4 inches long, by 1.5 inches wide and an inch thick and very heavy. May be a Pithecollobium. There is very much grass here, but not in condition to study or collect. Hills mostly covered by brush 20 feet high. Some large cane fields. River near by on the south. I should judge that the mountains are about 10 miles off to the east and 2,000-3,000 feet altitude, and apparently covered with brush. Air feels quite moist but it is very hot at noon. The city is the usual Mexican one. There are some autos, no carriages seen.

Saturday, February 26, 1927. Went south along the track to and a little beyond the river to the old time sugar mill. Here they have an old fashioned sugar crusher run by steam, the rollers horizontal, and below them a cement tank 2 feet square into which the sap falls. Then a force pump raised it ten feet to some boilers which are wood-fired below. Each boiler is about 20 feet long and the sap is skimmed by mosquito-netting skimmers. Then at the farther end the sap is let into two circular cast-iron vats 4 feet wide and again boiled down to sugar bubbles and skimmed again and continually stirred by wooden shovels, all by hand. Then when it will caramel it is ladeled out on to wooden slabs with conical holes bored nearly through and 1.1½ inches deep. The holes are kept moist with water and are then poured full of the hot liquid which at once sets. When sufficiently cooled the slabs are carried to vats and reversed and pounded on the bottom with wooden mallets, and the sugar cones drop out. The slabs are then rewetted and used again. The sugar cones are called pinoche and are packed in crates weighing 100 pounds or thereabouts and shipped or sold. This sugar is brown and entirely untreated, and is the chief article of commerce. Here I got quite a lot of fine specimens in an abandoned field near by. Here I saw a date tree growing wild in the brush. The river here is about 200 feet wide, and flows slowly. Every day there were about 150 women strung along in the water washing clothes on rocks used as rubbing boards. Each woman up to her hips in the water, and with a single garment hanging by the shoulders. Boys guyed me again today but were not specially offensive. There is a warty-spined tree like the Bombax but has flowers in corymbs or Sapindus-like clusters. It has few branches and the bark is gray and spongy. Got a Lemna here. Met a civil engineer in charge of the railroad here who says 10% of the gross revenues of the railroad go to the federal officials, who steal it. Says they will lie when cornered, and then laugh at you if you believe them, and that there are no honest public officials. He says it is a great change since the revolution in that respect,

and yet Calles executes all bandits. Hear many birds singing here.

February 27, 1928. Yesterday clouded up and looked like rain but cleared off this morning. Will be hot. Dead weeds in the streets show that there is much rain in summer. Weeds mostly Malvaceous, 2-3 feet high, with some Euphorbia. There is a little turtle dove here, about half the size of ours, with short and black bars on wings, and black tips to tail. The head is lighter than the body. They are very quick. Saw three Californian quail yesterday in the brush. I heard their call at Tepic but did not see them. At Ixtlan there are two kinds of buzzards. I also saw crows.

February 28, 1927. Went to the El Tigre mine on horseback. This is some 26 miles east of Acaponeta, and the mine is 1,400 feet altitude, but the mountain back of it goes at least as much higher. It is at least 10 miles to the crossing of theAcaponeta river. The water flowing there being about 150 second feet, and clear. Then began a long climb up the mountain. At first the region was somewhat mesa-like for a few miles through rolling hills. Then up a long gulch with steep sides. It was very dry all the way, and hot, but the canon where shady was moist where there were ferns and Selaginella. Stopped at a hut not far from the river to get a bite to eat for breakfast, and also at another hut in the canon for lunch. At the mine Mr. Kelso and the manager were very kind and gave me every convenience to recover from the strenuous ride. Next morning I went through the mill with the manager, and collected some plants on the way. Then started back, leading the mules and botanizing along the way, getting a great stack of things. I saw a tree they call Tapoma, whose branches they cut down and feed to the cows in dry spells to make them give more milk. The tree is very tall, has bark like the shag-bark hickory, and leaves like the elm. They say it will increase the breasts of women and is used for that purpose, and that the fruit is also eaten, and tastes somewhat like the cherry. The bark is white or whitish. Oaks were everywhere on the way down about the hill but saw no pines there. Many plants they call palmilla (possibly Sabals). Saw and got a very peculiar Selaginella which was creeping and rooting. There was considerable Lygodium along the way in the brush. Got the fruit of the warty-spined Bombax (?) tree. It is like the fruit of Malva, is 4 inches wide and 2 inches thick and stands erect andsingle. Saw a very narrow Tuna ( ) like the big one but joints only 2 inches wide by 6-8 inches long and flowers yellow. Saw a few 4-angled Cereus with short trunk and sprangling branches, different from any seen hitherto. The epihytic Cereus is common and mostly 3-angled and grows in trees or on the ground. The agent at Acaponeta was very obliging and fixed up my baggage so that I could leave on the train at midnight. Very hot and dry. There was a fog in the morning, and dew every night. The Cereus Pringlei is scarce here. The railroad agent gave me two for one on my Express checks and so made 10 pesos out of me.

Reached Mazatlan at 8 a.m. and got no sleep on the way. Now on train bound for home. Stratus clouds. Train with 6 cars loaded. Corn tasseled out. New vegetation about 6 inches high. Antigonum leptopus is

here too but less common. The big yellow flowered tree without tube to corolla is here but low. Marsilea covers the ground in places, large patches.

Near Culiacan. Half a mile from the sea. Several new Cereus here. There is a shrub with brilliant-yellow twigs, leafless now. Bombax, Cereus Pringlei. Brush now low. Amole with purple leaves.

Ojabe (?) station, 675 kilometers. Caesalpinia pallida, Yellow Lantana. Rochella. Brush now about 15 feet high.

Tanques station, 698 kilometers. Much charcoal here. Fouqueria peninsularis. Below a way I saw some Parkinsonia aculeata, first seen so far. Sky-blue-flowered Solanum, no white ones. Have passed through many miles of shrub that looks like Lysiloma, with many white stems arranged in corymbose style coming out near the base and having horizontal pods 4 inches by ½ by ¼ inches, a leguminous plant, near Prosopis. Passed great globose balls (?) of a night-blooming Cereus-like-flowered tree, like that at Barranea. About 75 miles south of Culican saw three of them. Parkinsonia more frequent now. Hot, traveling fast. Olneya. Getting drier fast and hotter. Now at Culican. Town is on east side of track by the river. About 30 miles north of Don got a Franseria with ovate leaves. Capparis. There is a brilliant-pink flowered bush 10-15 feet high that is not Antigonum leptopus. Saw it first near San Blas. Fouqureria peninsularis is out of leaf now, but in flower and fruit. Palo verde common here, also Cereus Thurberi. Mesquit in bloom, Cereus Pringlei a little past the peak of blooming season. Very dry.

Navajoa, Cajeme. Very big town, very hot and dry. Encelia cordifolia in bloom. Vines now. Palo verde, Olneya, much mesquit.

Fifteen miles north of Bacum we strike what looks like the true Cereus giganteus; stems are a foot or more thick, strict and with few branches, and no joints, at least twice as thick stems as in Pringlei, but no flowers yet: many woodpecker holes in trunk, ribs at least 15, may be more and shallow, a stately tree. Encelia everywhere. A Malvastrum like angustifolium in bloom.

Lencho. Here are two finished forts with sentinels. Long-leaved Franseria common. Helianthus Californicus (?). Cereus Pringlei getting a little past bloom. Opuntia leptocaulis in bloom, the flowers lemon-yellow. Much haze. Several Leguminosae in bloom. Mesquit nearly in full leaf.

Saturday morning. Left Guaymas about 8 p.m. Took sleeper and got my first good rest. Now 9 a.m. and we are below Magdalena. Hot and clear. Very much of a yellow-flowered plant like Senecio Douglasii. Little else in bloom. Mesquit and Larrea everywhere. A little way above Magdalena saw Rumex hymenosopala, Sambucus glauca. Grain a foot high. Peaches and pears in bloom. Bush like Baccharis but flowers in flat corymbs and yellow (Trixis). Some barley heading out. I saw Plantago major at Ixtlan and Acaponeta and also below Nogales. Cottonwoods just coming into bloom at Nogales. No other vegetation out. Got to Nogales at 1:30 p.m. Took an hour to get baggage over to U. S. No inspection at either place. Got dinner and took stage for Tucson to

get the evening train home from there.

Niland. Annual vegetation a few inches high. Astragalus limatus in bloom, Encelia eriocephala in bloom. Had a hard rain here in last few days. Everything wet.

NOTES AND NEW SPECIES OF MEXICAN PLANTS

"Anemia intermedia Copel Sp. n.

Rhizomate breve, adscendente; stipitibus pluriseriatis, fasciculatis, usque ad 8 cm. altis, rhachibusque pilis ferrugineis fuscentibus 1-2 mm. longis densissime vestitis; fronde 5-8 cm. longa, ovata, tripinnatifida, inter pila albida aliis hyaliniis nitidis minutis pluricellaularibus absita; pinnis infimis frondum maporum fertilibus, late ovatis sequentibus vix aequantibus, horizontalibus, bipinnatis vel maximis rhachin prope etiam tripinnatifidis, lamina valde contracta pilis omnino occulta; pinnis sterilibus inferioribus, 3 cm. longis, brevissime pedicellatis; pinnulis infimis suboppositis, pinnatim incisolobatis.

Mexico, Nyarit, Acaponeta, "El Tigre Mine," altitude 1,000 m., Marcus E. Jones, No. 23472, March, 1927.

The nearest relative is *A. Brandegeea* Dav., a much smaller and correspondingly less dissected plant; both are alike distinguished from *A. anthhriscifolia,* probably their nearest relative, with long-taslked fertile pinnae, by the comparatively slight modification of the latter. The suggestion naturally raises itself that this is an ample form of *A. Brandegeea,* respectively that the latter happened to be described from a very stunted form. But it is very clear from the uniform and freely fruiting material of that species in the Brandegee herbarium that the specimens are fully adult. If dwrafed, then, it must have been by the environment, which would almost certainly have accentuated the hairness. But the plant here described is not only much larger, but also decidedly more hairy, the difference being most marked on the fertile pinnae. Also, the broadly club-shaped shining microscopic pluricellular trichomes are distinctive. Beyond the almost or apparently opposite lowest pinnules, the succeeding ones are borne lowest on the acroscopic side.

The termination of the specific name *Brandegeea* was clearly deliberate on Davenport's part, as shown, in connection with the publication, by a manuscript postal card preserved in the Brandegee herbarium. It can be construed only as a proper noun in apposition. However much better Maxon's change to the genitive *Brandegei* conforms to general usage, I do not believe that it is permissible, any more than is a change in Swartz' spelling, *Anemia.*" Copeland.

Remarks by Jones. I have seen the postcard referred to and agree that on its face Davenport wrote the word Brandegeea, but it is in my opinion a clerical error for Brandegeeae, he intending to honor Mrs. Brandegee.

The type specimens and localities were accidentally omitted from the following:

Pentstemon flaviflorus Jones Cont. 12 66. Colonia Juarez, Mexico, September 12, 1903, 6,000 feet altitude.

Collinsia Brucae Jones Cont 12 69. Little Chico, California, June, 1897. No. 2063, Mrs. Bruce.

In regard to the blunder in my key referred to by Fernald I would say that the error arose in my finding other material with more leaflets than in the type species and which I referred to the type, but I failed to correct my key accordingly. This would tend to vitiate Fernald's new species.

Allionia and Wedelia were first named by Loefl. in Iter 191 and 180 but with no species attached (1758). The first mention of species is in Linnaeus's Systema ed. 10 890 where both genera are mentioned with species. The question of priority seems to be based on which genus came first on the page.

Himantostemma Pringlei Gray. This plant seems to grow at La Paz. Certain things which Gray failed to see in this plant are very peculiar. The very rough pubescence is made of tapering hairs which are warty and stand out straight from the stems and leaves. The bark is very corky and splits up into rectangular areas. The copious hairs on the inside of the corolla are flat and ribbon-like, and mostly white and about as long as the appendages. The outside of the corolla is hairy like the leaves toward the tip and the segments are conspicuously 10-veined.

Callitriche Mexicana N. Sp. Plants wholly submerged. Leaves

Drymaria crassifolia Bth. It takes a tremendous stretch of one's imagination to accept this species as a Drymaria. It is clearly perennial. linear-oblanceolate, about 1 cm. long and 2-3 mm. wide. Internodes short. Flowers sessile. Fruit oblately rounded, about 1 mm. wide, rather deeply notched above and below and nearly sessile. Growing in ponds at Tepic, Nyarit, February 11, 1927. No. 22877.

Drymaria Tepicana N. Sp. A weak and diffuse annual with fibrous roots, and widely branched throughout, a few inches high. Ashy throughout with slender, white and flat jointed hairs, particularly on the internodes and calyx, the leaves sparsely hairy, uppermost floral internodes smooth, but pedicels hairy. Leaves rhombodial and deltoid-acute at both ends, about 8 mm. long, on stout petioles half as long as body, thin. Internodes 4-grooved, hardly twice as long as the leaves, few. Inflorescence twice as long as the rest of the plant, with scale-like lanceolate bracts about as long as the sepals, intricately and dichotomously branched and with many flowers on divaricate and capillary pedicles about 6-9 mm. long. Flowers 2-3 mm. long, broadly ovate. Sepals green, nerveless, oblong-ovate, acute, with very narrow hyaline border. Petals rudimentary and linear. Growing in waste places in fields, partly erect. Tepic, Nayarit, February 16, 1927. No. 22847.

Drymaria subsessilis N. Sp. Stems apparently annual, growing in mud, very weak and filiform, a foot or two long and prostrate, with internodes 2-3 inches long, divaricately branching throughout and wholly glabrous. Leaves when fully developed about 1 cm. long and 1.5 cm. wide, round-remiform and pointless, almost sessile on very stout and thick petioles. Flowers 2-5, rather cymose, on divaricate and capillary pedicels about 1 cm. long. Bracts about 1 mm. long, hyaline with green center, and acutish. Flowers about 4 mm. long, open. Sepals narrowly eliptical, almost nerveless, and pointless, and with hyaline and broad margins. Petals about a half longer than the sepals, with divisions nearly linear. Growing in rivulets at Ixtlan, Nayarit, Feb. 19, 1927. No. 22848. Stipules hyaline and terminating in hair-like tips. Plants occasionally rooting at the nodes. This species may be D. cordata Willd.

Drymaria Blasiana N. Sp. Annual, diffusely erect, intricately much-branched with fiiliform stems dichotomously branched at nearly every node, and ending in loose and sub-racemose cymes of greenish flowers. Whole plant rather roughly glandular hairy with flat, very short, blunt and bent white scurf or hairs, particularly the sepals. Internodes about 4 times as long as the leaves. Leaves ¾ to 1 cm. long and about ¼ wider than long, rhomboidal to almost reniform, thin, abruptly cunate below, very abruptly deltoid triangular at tip, on a petiole about 3 mm. long. Stipules capillary and about half as long as petioles. Bracts of the inflorescence like the sepals and ¾ mm. long and acuminate. Lower nodes of the inflorescence with a single flower on a pedicel fully half as long as the flower, then a subracemose floral arrangement of 3 to 5 single or twin flowers with bracts, and a terminal cluster of mostly 3 flowers with short pedicels. Fully developed flowers 3-4 mm. long,, n,arrowly elliptical and acute, ,opening but little in anthesis, w,ith narrowly eliptical sepals with broad and scarious margins, the tip rather lacerate and abruptly setaceous-cuspidate with a hooked or arched spine about 1 mm. long or less. Back of sepals strongly keeled when ripe with 1 to 3 raised nerves. Petals white, deeply notched and about half as long as sepals, and narrow. San Blas, Sinaloa, January 20, 1927, growing in open places. No. 22845.

Cleome Sinaloensis Brandegee. Zoe 5 198. This slender annual is about 2 feet high, and erect, and openly branched as in C. lutea. The terminal inflorescence is short and few flowered, and with conspicuous leafy bracts clustered. The leaflets vary from broadly ovate to triangular acuminate, generally about an inch long and very short-petioled. The pods spread indifferently from pendulous to erect, are rather flattish, very torulose, empty and acuminate at both ends, green, nearly straight, the empty parts 3-4 mm. long, with the proper stipe rarely over 4 mm. long, body about 3 mm. wide, linear. Seeds 10 to 15, yellowish, sharply warty all over or sharply ridged. The whole habit of the plant is that of Epilobium paniculatum. My specimens got at Mazatlan in fruit November 20, 1926.

Wislizenia. I agree with Brandegee that there is but one species of this genus in Lower California. So far as I have seen all the Lower California specimens are shrubs, and are quite common at La Paz along the beach. I also saw the same species, clearly an annual, and collected it at

Hermosillo in 1926. Petals 3-4, almost rotate-spreading, concave, slightly clawed, 1 cm. long, the upper two a little smaller, contiguous; the lower pair opposite and occupying the middle, there being a distinct hiatus where the fifth petal should be, and this space occupied by the declined stipe. This gives the appearance of a leguminous flower with the keel absent. Stamens widely spreading, and with filaments arched. Anthers acute, linear, extrorse and curling inward when open. Stipe of pod 1 cm. long, very slender, as is the not capitate style. Pods arranged as are the testicles of dogs. To my mind the attempt to break this genus up into several species is futile because the characters have no ecological or structural worth. In the north, where the colds of winter make real differences in structure desirable and useful to the plants, certain characters have significance, but in the south, where there is no cold to combat, we cannot carry our methods and make them apply to conditions of growth, which are the only determining factors. There are many plant structures which in their native areas have significance, and those plants having them take with them as they migrate to other life ones, and which in time they drop as useless organs, but which at the present time are not entirely obliterated. For example, most of the pears and cherries are immigrants from the south and have evergreen leaves which they are hard to lose. The same is the case with the Sycamore (Platanus racemosa), which also is a true evergreen, but in northern Mexico and California tries to become deciduous. The reverse is the case with the elm, which is a nautral deciduous, but which carries this tendency everywhere to shed its leaves in the early fall in the Tropics. The same tendency, that of holding over the winter, is seen in the Eschscholtzia, in Helianthus annuus, in most winter annuals, in Wislizenia, in Gossypium Barbadense, which in California is an annual but in most of Mexico is a woody shrub, etc.

Iodanthus striatus N. Sp. Erect annuals, 2-3 feet high, copiously and racemosely branched throughout with ascending branches. Whole plant smooth or the older and lower leaves sometimes pubescent with short and simple hairs. Leaves thin, 2-3 inches long, ovate-acuminate to lanceolate-acuminate with cuneate base and slender petiole about half as long as the blade, mostly entire, but lower ones sometimes sparsely dentate. Flowers in long and terminal racemes which are bractless, white. Sepals about 3 mm. long, narrowly elliptical, green, with white margins, several nerved, thin, the outer ones rather saccate below. Petals oblanceolate and rounded, with two pairs of short teeth on the sides, distinctly clawed, spreading, 6-7 mm. long, conspicuously nerved. Stamens ovate and acute. Pods about an inch long, mostly horizontal, flattened parallel with the partition, smooth, a little torulose, conspicuously several-nerved, shortly stipitate, conspicuously beaked with beak fully 1 mm. long. Stigmas rarely a little lobed transversely. Seeds oblong, not winged, yellowish, about 12. Partition very thin, with short and rather oblong but distorted meshes. Pedicels filiform, about 6 mm. long, spreading. This plant has the technical characters of Idodanthus more than of Dryopetalon but it has the toothed petals of the latter, and grows in similar situations. Waste places, Todos, Santos, February 17, 1928, in washes north of the

town. No. 24189 and 24130, February 8.

Argythamnia bicolor N. Sp. Slender shrub, 2-3 feet high, erect, stems and upper inflorescence hoary with very short white and spreading hairs, and above with stalked and yellowish glands intermixed. The margins of all the leaves glandular ciliate, as are the sepals. Leaves oblong-elliptical, 3-6 cm. long and rarely 1 cm. wide, obtuse, cuneate below into a slender petiole 1 cm. long, sparsely and softly pubescent on both sides with very fine hairs some of which are gland-tipped, and some are copiously branched as in Alternanthera. Upper surface of leaves brownish, lower surface strikingly yellowish-white, but without extra pubescence, the color arising from the epidermis, from which character arises the name. Inflorescence in the upper axils, about 1 cm. long, with the two or three male flowers above, and the single fertile one below. Bracts of the inflorescence 3-4 mm. long, lanceolate and conspicuously and apparently laceately toothed because of the green and stout bases of the glandular hairs, which characteristic is also with the sepals. Sepals linear and 3-4 mm. long, nearly a half shorter than the oblanceolate and red-striped petals. Pods depressed-spherical, about 4 mm. long, blue-black, appressed-hairy slightly. Seeds tan-colored, irregularly and rather deeply pitted, truncate-ovate, and nearly 3 mm. long by 2 mm. wide, acute at the closed tip. No. 22727, Hermosillo, Sonora, October 26, 1926, growing among the rocks on the mountain back of the city. Whether this is A. subviscida Watson I do not know, since I cannot find the description of that species. But this is a remarkably distince species, and allied to the narrow-leaved species group.

Desmodium luteo-canescens N. Sp. Shrubs 3-5 feet high, erect, slenderly and racemosely branched and with branches erect, and reddish and nearly smooth, terminating in compound racemes, and leafy to the bases of the proper racemes, which are about 6 inches long and linear because of the rather appressed flowers and fruit. Leaflets 3, the terminal one about twice as long as the lateral and 4 cm. long and 1.5 cm. wide, elliptical-ovate, flat, rather thick, venose below and a little lighter there, densely short-yellow-hairy all over, with petioles shaggy, and about 4-6 mm. long. Banner sky-blue, becoming not over 4 mm. long, the stamen tube white. Calyx short-pubescent, the lobes ovate, becoming triangular and elongating somewhat, about 1 mm. long. Young fruit densely hoary, and becoming rather short-shaggy, spreading, with yellowish hairs which are rather flexuous but not hooked, sections mostly 3, contiguous, 4-5 mm. long, obliquely oval, rather strongly cross-reticulated and with thickened margins. Pedicels in fruit about 5 mm. long and capillary, and ascending. No. 23054, got at Acaponeta at the El Tigre mine in oak woods, March 1, 1927. This belongs to a group with the rounded and very obtuse leaflets, not apiculate, but cannot be placed anywhere apparently. Stipe 2-4 mm. long. Terminal joint apiculate and not produced. Leaf-rachis twice as long as petiole proper.

Desmodium luteo-canescens var. curtum N. Var. Pubescence sparse on the upper part of the leaves and legumes, and leaves much more deeply venosely reticulated. Joints of fruit with short stipe between which is

mostly 1 mm. long, main stipe fully to twice as long as first joint. Joints either round or rather broader than long, not 4 mm. long, 3-5, the terminal one long-apiculate, all greenish. Stipe of the type species never is over half as long as the first joint. No. 23055. Ixtlan, Nayarit, February 18, 1927. Flower deep-blue.

Malpighia Sonorae N. Sp. Allied to M. ovata Rose. An intricately branched shrub a few feet high, and nearly glabrous, with the habit of Symphoricarpus oreophilus. Leaves opposite, oval-ovate to ovate, about 2 cm long by 1 cm. wide, thin, entire rounded at base and the upper ones shortly acuminate or acute at tip, or the lower ones oval and very obtuse, covered below very sparsely with long and very slender white hairs fixed by the middle (as in M. urens), on short and stout petioles about 2 mm. long and which are silvery silky, as are the nodes. Stipules hardly longer than the hairs. Flowers not seen. Fruit depressed-globose, red, ,about 7-ribbed by the protruding and sharp ridges on the seeds, red, about long, on slender pediael sometimes joined below the middle cnd a little over 1 cm. long. Fruits few to single on a short peduncle rarely half as long, on slender pedicel sometimes joined below the middle end a little ovata Rose, but the leaves are decidedly different. Guaymas, Sonora, November 2, 1926. No. 22598.

Viscaionia geniculata. Tree-like shrub, 10 or more feet high, tufted stems erect, with smooth grayish-green bark and no thorns. Flowers dull white, about an inch wide and opening widely. Sepals 3-4. Petals 3-4, obovate, palmately ribbed from tip to base and most below, rounded, ¾ inch long, inserted at the base of a dark stipe which is widest below and half as high as wide. Stamens the same insertion, 6-8, twice as long as petals, or a little shorter than petals, on fleshy acuminate and rounded and stout filaments. Ovary white-strigose, 3-4 celled, oval, tipped by a stigma of 3-4 incurved and oblong lobes whose edges are contiguous and form a sphere. Style equals the ovary. Sap not milky. This is my No. 2474. Got at La Paz.

There is an Agave growing on the rocks at La Paz with bluish, thick and very rigid leaves (after the fashion of A. Utahensis) with very coarse and fleshy teeth 1½-2 inches apart, and ending abruptly in a black and hooked prickle ¼-½ inch long. The stalks are slender and cane-like and 10 feet high and few-flowered, in 2-4 bunches. Was just coming into bloom.

Agave. This is the big blue Agave with narrow leaves, so much cultivated at the Cape and Todos Santos. The stems are 4-6 inches thick, and about 30 feet high, with many clusters of glaucous-blue flowers which become yellowish-green when expanded, but the whole plant is conspicuously blue. Leaves 3-4 feet long, with low prickles 1-2 mm. long and an inch apart. The leaves narrow and tapering.

Agave aurea Brandegee. This wild plant abounds on the mesa north of Todos Santos on the auto road to La Paz. The stems are stout, about

10 feet high, with very many clusters of purple-black buds which become golden-yellow in flower. The leaves are 2 feet long and not congested, they even become 4 feet long at times and six inches wide. The prickles are low, a few mm. long, and ¼ to ½ inch apart. Leaves conspicuously lanceolate, also narrowed below but widest at very base. It is a very stately Agave, the most stately of them all. It also grows on the rocks on the eastern slopes of the Lagunas.

Rhachidospermum Mexicanum Vasey. To the last Vasey held that this was not Jouve pilosa, but most everyone elsa considers them the same. The plant abounds on the Coast from Todos Santos around La Paz.

Nolina Beldingii (?). This grows on slopes of the Laguna mountains in the brush. The leaves are 3 feet long by ½ inch wide, and long and grass-like.

Euphorbia Arizonica has pods a trifle hairy, appendages not lacerate the glands. The seeds are the same. No. 6437 Purpus. Plants with the same name Parish No. 8087 called setiloba by Parish is polycarpa. This is a part of Johnston's type. The same name is Thornber's No. 341 from Wilmot, Arizona, and is Fendleri. Same name (given by Wales as polycarpa) from Imperial valley No. 64700 is polycarpa.

Simmondsia Californica. At Todos Santos I find that pistillate forms are rare except on northern slopes of hills. The plants become 20 feet high, and are very much branched. The fruits range from ovate-acuminate to almost oval-ovate. No such extravagant development is found in this species at the north.

Euphorbia podagrica Johnston is only a form of Fendleri, lacking

Euphorbia perina Wat. is only a form of polycarpa.

Brandegee puts it in E. pocarpa.

Quercus Brandegei Goldman. The type locality for this tree is Miraflores. There it is a big tree 50 to 60 feet high, sprangling out very widely with few and very big branches, has the habit of a white oak. The smaller branches have very smooth old bark. The leaves are shiny above. The cups are deciduous in racemes. The plants were just coming into bloom on the first of March, 1928. The ground was covered with young plants from the last year's crop of nuts. It is the only live oak at Miraflores, and abounds along the river banks but not near water.

In the Cape region are many live oaks. Their native habitat is in the high mountains at the upper edge of the Tropical life zone, but their tough and shiny leaves enable them to exist at much lower elevations, and we find them straggling along the stream lines in a few favorable situations as far down as the sea, but these conditions are always those with a moist soil. At Todos Santos grows a live oak Quercus Brandegei Goldman, in a wash that seems to be the same as the one growing at the Cota ranch and at Miraflores. It is an erectish tree about 40 feet high, with white bark above, which breaks up below into narrow and rough areas. At the Cota ranch it has leaves often oblong and scarcely cut on the margins. The cups have very low warts. The nuts were all gone, consumed by animals.

Fouquieria peninsularis Nash. This species replaces F. splendens at the south but is not always separable from it easily. Splendens has no true trunk but the many canes come out at the ground in tufts, and are seldom larger than walking sticks. Peninsularis has a main trunk below the first branches and is often racemosely branched above with mostly twisted branches. At San Blas Sinaloa and at San Antonio, Lower California, it reached 20 feet high, with a trunk at least a foot thick at base, and with the main trunk 10 feet high. It has the same flaky bark, and is common all the way south of Carbo, growing in the brush along with Cactus and Leguminosae. In winter always in full leaf.

Dalea maritima Brandegee. This grows on the sand spit across the bay from La Paz. It seldom rises more than 2 feet high but spreads along the ground with the lateral branched prostrate and often 6 feet long and slender. Flowers purple and white. Strongly odorous, perennial, and sometimes a little shrubby below, a vigorous grower with the habit of an Astragalus.

Acacia. This genus is badly balled up, containing fleshy-fruited and flat-fruited species.

Diplandra lopezioides H. & A. Standley in Shrubs and Trees of Mexico, page 1075, says of this species: Leaves "serrate." They are not only entire but so figured in Bot. Beech. fig. 60.

Euphorbia Preslii and Brasiliensis rest on very thin lines. The only difference I can see is that Preslii has fine wrinkles on the face of the seed, and Brasilensis has two ribs.

———— ———— This is a red flowered bush 6-8 feet high, erect and very bushy branched from base. The older bark is rough lengthwise. The twigs are glaucous-blue-green, rigid but not spinose. Leaves oblanceolate and almost sessile. Calyx a mere rudiment and truncate. Corolla urn-like, sessile at base of a thick disk 1 mm. high, which is radiantly 10-grooved. Corolla lobos 5, closely reflexed, deltoid, yellowish within, red outside. Stamens sessile at end of tube, with a little tuft of hairs, no filaments. Fruit a spherical and pulpy (1-seeded ?) berry or (?) Corolla falls when ripe. Anthers wide and short. La Paz, February 9, 1928, on the east.

Cereus Allied to Engelmanni. This grows in clumps several feet square, is about 8-12 inches high, and 2-3 inches wide. Spines sometimes 4 inches long and flat below. Fruit very spiny. No flowers. It is a fast grower. This is common at Todos Santos and occurs at La Paz. The Mamillaria also grows in it at times.

Cereus Schottii varies greatly in the thickness of the stems, and rarely has whiskers on the top (then becomes the viejo) and then has been called by another name, but this tendency to have whiskers occurs in all the species of Cereus that become big. Often there are prostrate stems among the others.

There is a Mamillaria with slender stems and conspicuously raised ridges and tubercles that leads one to think it is an Echinocactus. I saw one patch of it that I took to be Cereus eruca on the mesa near Santiago (east of Miraflores). This is the same thing that grows at La Paz on the

east. I took a photo of it but did not get a good one.

Mamillaria Sp. This grows on the rocks at Todos Santos at the north of the town and hangs down 2 feet, and is about 4 inches thick, and has the single hooked central spine. Saw no flowers or fruit.

Mamillaria Heyderi (?) This seems to grow on the mesa toward the sea from Todos Santos. The flowers are ¾ to an inch long, greenish-white. Petals barely fringed. It seems to accord in every way with the species growing near Colnett, north of San Quentin bay, and which I had growing in my garden.

Polygala apopetala Brandegee. This, take it all in all, is the most interesting shrub I saw. In the surprise it produced on seeing it first I can recall nothing more unique than the redbud, Cercis occidentalis, which blazed at me out in the desert of the Grand Wash, Arizona, in 1894. It is the same brilliant red-purple. The stems are 6-8 feet high, and very open and slender and tufted, growing in an inaccessible cliff, with the cane-like stems racemosely branched above, and ending in long racemes, a foot or two long. I also got it later in similar situations at the Cota ranch, but secured specimens at great risk, February 21, 1928. No. 24157. It was too early for fruit at that time.

Jussiaea clavata N. Sp. Near to suffruticosa. Stems inclined to be woody below, 2-3 feet high and ascending and reddish, and pubescent with slender spreading white hairs, as is the whole plant up to the sepals. Stems mostly simple and racemosely flowered above the middle. Leaves soft, 1-2 inches long, elliptical-lanceolate, entire, shortly-acuminate, almost sessile from a narrowed base, 1-nerved and with many close-set and parallel lateral nerves. Calyx lobes accrescent, ovate to lanceolate-acuminate, purplish, 1 cm. long, half as long as the very broad and light-yellow petals. Fruit 2-3 cm. long, linear-cuneate and truncate, becoming clavate at tip by swelling out, about 8-striate, acuminate into a short stipe, ascending. Seeds minute, oval, flattish, with a groove along one side. Growing in wet places, Acaponeta, Nayarit, February 24, 1927, No. 22871. No.

Ludwigia Tepicana N. Sp. Slender and erect shrub 4-6 feet high, with sharply 4-angled stems winged on the angles, smooth throughout. Leaves about an inch long, linear-elliptical-lanceolate to oblanceolate and entire, and with revolute margins acuminate below into a minute petiole, longer than the internodes. Flowers all distinctly pediceled, in fruit about 4 mm. long and stout, single in the upper axils, nearly 1.5 cm. long. Petals lemon yellow, obovate, very thin and evanescent, about 1 cm. long. Anthers linear, curved, splitting throughout and emitting a spherical pollen which is rugose. Anthers on capillary filaments half as long as the petals. Stigma spherical at tip and on an elongated style half as long as petals. Calyx broadly turbinate, 4-5 mm. long and nearly as wide, 8-ribbed, with deltoid and green teeth hardly 2 mm. long, which are not accrescent. Calyx with a spatulate and leaf-like bract about as long as itself. Seeds ½ mm. long, cuneate, 4-angled, and with rather concave sides, light-yellow, many. No. 22874, Tepic, Nayarit, February 12, 1927, along watercourses. Also No. 22875 at Ixtlan, February 19, 1927. I also refer here No. 24290 from Miraflores, February 28, 1928, with almost

linear leaves and somewhat smaller flowers. Also my No. 228, got at Pastorillo, Zacatecas, Mexico, May 2, 1892. Though this has the flowers sessile and a little wider leaves. This is not the same as alternifolia nor polycarpa.

Mamillaria, San Jose del Cabo, January 18, 1928. This plant grows on granite hills along with Echinocactus Falconeri, Cereus, Opuntia, etc. The stems are single or in small tufts of rarely 6. It is a few inches to a foot high, nearly erect, 3 inches wide. Flowers near the tip but never on the tip, greenish-white, ¾ inch long, only partly open. Petals not lacerate, nearly linear, the outer ones reddish and striped in the middle. Fruit linear-clavate, orange colored, ¾ inch long. Central spine shortly and sharply hooked.

Cereus Pringlei Watson. East of San Jose del Cabo, along the road and in bloom. Ribs 10-12, with a wide scallop between. Trunk varies from 6-12 or more inches thick, and 30 feet more or less high, always blunt at tip. Old stems are bald at tip (whence the name calvus), a few individuals have whiskers toward the top (like the viejo cactus). Flowers open in the forenoon, dark-purple on the outside and nearly always closed, when open the inside is white and tips of petals recurved. The fruit is an oblately spherical burr with innumerable yellow spines felted together. There is a central trunk from which branch below the middle, candelabrum-like, a few offsets the same size as the trunk. This has been called Cereus titan, and C. calvus, but there is but one species.

Cereus Thurberi. This trim and neat species has a much smaller trunk, and branches near the base into several to many organ-like pipes (stems) which taper at the tip. The ribs are about 16-20 and close-set, the trunk 4-6 inches wide and sometimes 20 feet high, but rarely over 15 feet high, almost always with a distinct trunk though very short before it branches. It is a very vigorous grower. The aureoles are black and spines black. This is scarce above 3,500 feet altitude on the Laguna mountains. But is the most common cactus south of Nogales.

Echinocactus Falconeri. San Jose del Cabo, January 23, 1928. The fruit is smooth, globular, ¾ inch long, green but at last yellowish, persistent. Aureoles a little woolly, central spine erect, sharply hooked at the end, very much corrugated. The lateral spines are stiff hairs and white. The main spine is darker. Whole plant is bluish-green, plants 2 feet high and a foot wide. This is occasional through the Cape region on dry benches.

Antigonum leptopus Bth. Perianth with parts inserted at base, the three outer larger, and developing in age. Stamens 8, on a raised and purple collar and with apparently abortive inner ones like teeth. Anthers incurved and very wide, yellow. Styles 3, and with horse-shoe stigmas linear and also yellow. Young leaves softly pubescent. No. 24006; San Jose del Cabo, January, 1928.

Plantago hirtella var. annua. N. Var. Plants annual. About 6 inches high and slender. Leaves 3-nerved, linear-elliptical, about 4 inches long, entire and acutish surpassed by the peduncles. Spikes 2-4 inches long, narrowly linear, dense. Calyx lobes strongly 3-nerved and pilose on the

green nerves with flat and long white hairs. Corolla closed, the lobes acutely-ovate and white. In moist places among the live oaks, Laguna mountains, Lower California, March 2, 1928. No. 24403.

Mimosa Mazatlana N. Sp. Apparently allied to M. Ervendbergi Gray. A slender shrub climbing over bushes, with internodes 3-4 inches long, and slender filiform petioles about 3 inches long and divaricate, and similar peduncles a little shorter. Stems sparsely beset with recurved and yellowish prickles. Petioles with closely reflexed and slender hairs or setae. Under surface of leaflets with scattered and appressed setose hairs. upper surface shining and smooth. Pinnae 2, and with stiff stipels at the base. Leaflets two pairs, the lower pair with one leaflet aborted to a very small one, or even a scale. Rachis produced into a green bract sometimes 1 cm. long. Stipules subulate and stiff. Leaflets appearing as if digitate, 2-2.5 cm. long by 1 cm. wide, obliquely eliptical, acutish, apiculate. The midnerve above the middle, and with 1-3 nerves coming out at its base on the lower side. The leaflets all appear is if twin, the obliquity of the one a complement to that of the other. Pods are spike-like heads, several, flat, and thin and with scattered setae, jointed with 1-3 joints, not winged, about 2 cm. long and 4 mm. wide, inclined to be constricted, strongly apiculate and stiped with beak and stipe oblique and about 4 mm. long, green. The pods show a disposition to twist in age. The flower clusters are axillary below and become paniculate at the ends of the long stems. All the species of Mimosa are so very poorly described that there is no certainty about the species. The original authors of the species never seem to have thought it a matter of any moment to really describe their species as they could have done. No. 22447, Mazatlan, Sinaloa, Novembr 21, 1926, and No. 22446, November 29.

Mimosa aspera N. Sp. Slender shrubs 6-10 feet high, with gray bark, with scattered reddish spines flattened somewhat and sometimes hooked, and about 4 mm. long, the leaf rachis, often spinose also. Leaves with 3-4 pairs of pinnae and about 10 pairs of leaflets, which are oblong, about 1 cm. long, thick and shiny, acute, with midrib above the center and at base with two additional veins below it, and the base oblique. Pods many in a dense head, about 3 cm. long and 8 mm. wide, flat, straight, strongly apiculate but very obtuse, with the surface covered with subulate spines 2 mm. long, which are nearly round in cross-section, the nerves on the valves very thin and rarely spinose on the very edge, the septum not pointed. Seeds about 10, at maturity the pods open readily, showing the smooth interior. Stipe if any very short.

Astragalus ervoides H. & A. Bot. Beech. 417 1841. A. Lagunensis Jones. It would seem that this apparently impossible puzzle is at last solved. The conditions, ecological, are such that it is practically certain that it is my species above given. There is only one species of Astragalus known in the region of Tepic in the high mountains and this was the enigma found by Lay 102 years ago on his trip to Tepic from San Blas. No other man since seems to have discovered it in the region. In his botanizing on the San Francisquito mountains of Lower California Brandegee collected a plant which he sent me for identification, and which I

named Astragalus Francisquitensis N. Sp. Later he sent me material from the Laguna mountains, Lower California, which I named A. Lagunensis N. Sp. The material was sufficiently di_erent to warrant its being placed as a variety of the other. Now as to synonymy. Sheldon in Minn. Bot. Stud. 9 66 names it A. apertus Sheldon and puts it among the Uliginosi. Then on page 172 he gives it another name, Tepicus, and puts it in the What-is-its. All this was done because Turcz. created the name ervoides in 1838 for A. miniatus, Sheldon adhering to the stupid slogan, "Once a synonym, always a syononym." If the name ervoides is to be abandoned then A. apertus Sheldon must stand. All Sheldon knew about the species was what is in Bot. Beechy 417. When I came to name Brandegee's plants A. ervoides was in the discard asa species, impossible to identify. But since then I have been over the ground and collected the species. And the striking similarity of my species with Lay's is apparent. Lay's species is described as follows: "I Astragalus (Sect. Ciceroideae) ervoides; puberulus, caule gracili elongato-ramso, foliolis 15-17, remotis, linearioblongis, obtusis, stipulis lanceolatis, parvus, pedunculis axillaribus folio longioribus racemosis, racemis 10-12 floris, Calyce brevi-ornato oblique obtuse 5-dentato dentibus brevibus subaequalibus (pedicellisque) nigris, corolla (flava) calycem subduplo, superante, leguminibus linearibus deflexis curvatis acutis glabris."

"Hab. San Blas to Tepic. Our portions of this plant measures less than a foot, slender, they are branched and straggling, herbaceous. Leaflets about half an inch long. Flowers of the same lentgh, soon reflexed. The short cup-shaped calyx, with its obliquely 5-toothed mouth, has a few dark-colored short hairs scattered over the surface, yet so as scarcely to a_ect the green color; but the short teeth and the pedicels are quite black."

Astragalus ervoides Bth. Probably winter annuals, with central stems often erect and a few inches high, but mostly much branched from the crown into filiform and procumbent stems after the fashion of A. Nuttallianus which are 1-3 feet long and simple or sparingly branched above, and then with long internodes, whole plant even to the black-hairy calyx minutely appressed-strigose, except the upper side of the leaves, which is smooth. Stipules conspicuous, linear-subulate, adnate, not connate, reddish and hyaline, not over 1 cm. long, the floral bracts similar but shorter. Leaves linear, with about 8 pairs of broadly oblanceolate to elliptical-cuneate and retuse to truncate leaflets, about ½ cm. long. The leaves with short petioles or the upper sessile, widely spreading. Flowers racemose-spicate, on long and capillary peduncles, mostly surpassing the leaves. Pedicels almost none. Flowers about 5 mm. long, with white base and purple tips, narrow. Calyx tube short-cylindric but a little contracted below, hyaline, about 2 mm. long and twice as long as the linear-triangular teeth. The petals have been described when fresh above. Pods are linear, acuminate, nearly straight, sessile, spreading, smooth, triangular-cordate in cross section, about 1 cm. long by 2 mm. wide, deeply sulcate dorsally, 2-celled, with sharp and raised ventral suture. Pods much the shape of A. parvus. This corresponds closely with my A. Lagunensis, and I doubt that Francisquitensis is sufficiently different to be worth

varietal rank.

My notes taken fresh March 2, 1928, on the Laguna mountains, 3,500 feet elevation, are that the species grows on gravelly slopes among the live oaks. Stems prostrate after the first few inches, very slender, from an apparently winter-annual root. Flowers with banner purple, and with the white spot rectangular and veined with purple, with sides reflexed somewhat. Wings fully 2-3 mm. long, linear below, obtuse, much rounded, then oblong lanceolate, not flaring, connivent at tip and purple there, 2 mm. wide at tip. Pods 2-celled, linear-acuminate. Calyx a little laterally flattened, nisgrescent. The species is fully described in my Astragauls, page 267.

Astragalus Franciscquitensis Jones is likely to be A. ervoides H. & A. There is no other species that it would be so near, particularly the var. Lagunensis Jones. Very likely a comparison of the type ervoides if that is extant would settle the matter. If that is not possible then ervoides must always remain a puzzle. So far no specimens of my species have been found on the main land, and there is no likelihood of any being found "between San Blas and Tepic" except on some high mountain adjacent to the route to Tepic from San Blas. I do not know of any such mountain, but near Tepic some of the mountains seem to go up into the live oaks. I have not yet been on them. The species might well be called ervoides—vetch-like.

Stylosanthes prostrata N. Sp. Stems prostrate from a woody root, forming close mats 2-3 feet in diameter, rather rigid and freely branched throughout. Whole plant glutinous-hairy, with slender gland-tipped hairs which frequently have 2-3 swellings like glands below the tip, other hairs are slender and without glands and mixed in among the rest, the margins of the leaves and bracts are also beset with prickle-like hairs from wide and pustulate base. Nearly every node has a peduncle like branch 1-3 inches long terminating in a leaf and a sessile spike 1-2 cm. long. Leaves about 2 cm. long, of 3 leaflets on short petiolules, the proper petiole being nearly as long as the lateral leaflets, which are slightly shorter than the terminal one, which is about 1 cm. long and varies from oval to oblanceolate on the same plant, and always with an oblique and yellow spine-like apiculation. Stipules about as long as the lateral leaflets, hyaline and 3-nerved with raised and rib-like nerves and coming together above in a linear to subulate and rather rigid green and leaf-like tip as long as the body, the whole very pubescent. Bracts densely aggregated and overlapping, each subtending a flower, deltoid in outline and about 1 cm. long, trifid nearly to the middle into 3 green lobes, otherwise hyaline but strongly green-nerved, the lateral lobes inclined to be recurved and acerose and subulate, the central one linear and rather leaf-like but also acerose. Flowers exserted slightly, golden-yellow, 3-4 mm. long on slender pedicels. Calyx short and split into ovate to trangular lobes nearly to the base, reddish and smooth. Fruit appears sessile in the calyx as though there were two sets of flowers, one fertile and the other not. Fruit 2 mm. long, broadly oblong and truncate above, hyaline, terminating in the upper corner in an apiculation made by the tightly coiled style. Face of fruit with

a central green rib connected with the lateral nerves by cross veinlets and raised, forming an open net work. The older leaves seem pitted with dark areas whose sides have many radiating and glass-like lines. No. 24269, Todas, Santos, February 15, 1928, and No. 24002, at San Jose del Cabo, January 18, 1928, on dry mesas among brush.

Leucaena nitens N. Sp. Slender shrub about 10 feet high, smooth and shining even to the pods. Leaves little longer than wide, on slender petioles, 2-4 cm. long, which have a gland below the pinnae, but no other glands. Pinnae 3-4 pairs, these and the leaflets even-pinnate. Leaflets about 4 pairs, ovate to oval, about 2 cm. long by 1 cm. wide, acutish below and obtuse and apiculate above, green and shining above and lighter below, thick but not venose, the upper ones the largest, contiguous. Pods flat, linear, about 1 dm. long, 1.5 cm. wide, chestnut-colored, uniform in outline, shortly-acute at tip and acuminate into a stipe 1 cm. long, with thin valves showing the outline of the seeds through the surface with low and slightly raised nerves which are lateral, ascending, irregular and meshing in small areas in the middle. Seeds 5-7 mm. long, oval, flat, shining-chestnut-colored, about 15 to a pod. Pods open readily but valves do not curl. No. 22465, Mazatlan, Sinaloa, November 20, 1026, on hillsides.

Diphysa vesicaria N. Sp. Slender shrubs 6-10 feet high. Inflorescence a dense swab at the ends of the branches and very glutinous-short-hairy and without spines. Leaves rather tufted at the ends of branches, about 8 cm. long, pinnate, with 5-7 pairs of leaflets on a strongly sulcate rachis and petiole. Leaflets oblong, truncate to rounded at tip, about 2 cm. long by 8-10 mm. wide, flat, inclined to be acutish at base, green above and lighter below and more pubescent there, minutely pubescent all over. Flowers yellow, about 1 cm. long, racemose on the upper end of a slender peduncle, few. Calyx glandular-hairy, the tube contracted and 10-striate, abruptly enlarged at throat, and with triangular lobes spreading and twice as long as tube or more. Fruit on a stout stipe as long as calyx, the body when fully developed about 5 cm. long, and 1 cm. wide, very much inflated with collapsing and tissue-like walls, mostly of 2-3 sections separated by constrictions, which are oblong and with irregular outline, upper section conspicuously beaked. No. 22986, Acaponeta, Nayarit, March 1, 1927, on hillsides.

Phaseolus atomiferus N. Sp. Slender climber, 10 feet or more long, stems twining and retrosely and densely short-pubescent with white hairs, which also cover the entire plant, being densest on the under side of the leaves. Leaves on petioles about an inch long and stout. Leaflets 5-8 cm. long and about half as wide, cordate-rhombodial-ovate-acuminate, with conspicuously raised veins below and atomiferous with minute red and shining dots below. Fruit oblong, flat, about an inch long by half an inch wide, contracted at base and apiculate at tip, the valves twisting on opening and exposing the 1-2 seeds which are shining, globose-oval, 5 mm. long, the upper half black and the lower scarlet, and persisting on the ventral edge. The pods are racemose on a stout rachis, and several. Peduncle still stouter and an inch long. Flowers not seen. Growing

along with Phaseolus atropurpureus, over bushes. No. 24278, Todos, Santos, on mesas at the north, February 17, 1928.

Cracca lupinoides N. Sp. Erect shrubs 4-6 feet high, growing in clumps. Stems densely woolly-hairy with very short and ascending hairs which are yellow. On the inflorescence even to the banner densely felted. Stems racemosely branched above. Leaves a foot or less long, with normally 4 pairs of leathery leaflets 10-15 cm. long by 3 cm. wide, felted short-hairy below and shining above, conspicuously about 18-nerved below and reticulated below, acute to very obtuse and rounded at tip, mostly truncate below, with edges wavy as if subserrate, the lowest pair much smaller and appearing as if stipular but above the joint on petiole. Petiolules very stout, and about 5 mm. long. Inflorescence an elongated compound raceme with the laterals very short and few flowered, the flowers on pedicels about 1 cm. long. Bracts very small. Flowers purplish on banner and keel tip, and whitish in the margins, about 1.5 cm. long. Calyx and banner very yellow-woolly, teeth triangular and about as long as tube. Fruit spreading, very yellow-woolly, about 5 cm. long by 5 mm. wide, rounded, but slightly flattened, linear, the tip a triangular apiculation. This would seem to belong to the Toxicaria section but leaves quite different. Among the live oaks at El Tigre mine, Acaponeta, Nayarit, No. 23016, March 1, 1927.

Cracca collina N. Sp. Shrubs 3-4 feet high, and rather short-branched. All but the pods hoary with short and dense pubescence. Pods shaggy-hairy with long and yellow hairs. Leaves hardly 1 dm. long, of 3 leaflets, 5-7 cm. long and 2 cm. wide, obtuse and rounded or truncate at both ends, the veins many and raised as in lupinoides, and the same shape, rather densely pubescent above but less so than below. Fruiting spike about 1 dm. long, dense, of several contiguous pods hardly 1 cm long, rounded and ascending and very pilose, and about 5 mm. wide. General appearance that of lupinoides, but inflorescence different, pods much shorter, and leaflets only 3. No. 23015, Tepic, Nayarit, February 15, 1927. On hillsides.

Cracca axillaris N. Sp. Slender shrubs 4-6 feet high, widely branched racemosely and with sub-digitately branched axillary racemes about 1 dm. long. Stems yellow-felted above as are the leaf-rachis and petiole and petiolules. Leaves hardly 1 dm. long, of 3 pairs of leaflets, the terminal one much the largest. Petiolules about 4 mm. long and stout. Petioles rarely an inch long, and stout. Leaflets elliptical, 4-6 cm. long by 2 cm. wide, wavy-margined, thick, dark-green above and slightly hairy, and rather shining, lighter colored below and yellow-pilose on the veins and veinlets which are raised, rounded at tip to acutish at times, at base truncate to shortly-cuneate, overlapping. Racemes almost sessile, producing just above the base two laterals, and sometimes with an accessory one a little higher up, which are shorter than the central one which is racemosely flowered almost to the base. Flowers about 1 cm. long, purplish on the margins, the banner very yellow-hairy as in lupinoides and so is the calyx. Calyx lobes subulate and shorter than the tube. Pods short-hairy, conspicuously flattened and wavy margined, acuminate with a long

beak, and very shortly stipitate. No. 23022, El Tigre mine, Acaponeta, Nayarit, March 1, 1927, among the live oaks. This seems related to lupinoides in the leaves, but inflorescence entirely different.

Dalea Blasiana N. Sp. Slender and erect and widely branched shrub with long branches which are gray with very short and spreading pubescence, and internodes much longer than the leaves. Leaves gray with rather appressed hairs, becoming scattered above. Stipules subulate and colored. Leaves 2-3 cm. long, on filiform petioles about 1 cm. long. Leaflets 5-11, oval-obovate, rounded to retuse at tip, with many black or reddish glands, flat. Flowers in dense and almost sessile spikes 2-3 inches long which at first are silvery-silky, and black with age. Petals purple and almost as long as the capillary calyx lobes which are about 7 mm. long (including the calyx tube). Bracts with long and capillary tips, deciduous. Calyx tube 2-3 mm. long, with evident glands, silky-villous, open-capanulate, the lobes plumose. Fruit deltoid-triangular, with subulate tip produced on one corner, smooth below and long-villous above. One seeded. This plant is easily mistaken for a Lespedeza. No. 23040. San Blas Sinaloa, February 1, 1927. Plant about a yard high, growing on slopes.

Lotus ramulosus N. Sp. Allied to Hosackia Bryanti Brandegee. Prostrate and woody rooted perennial with very slender filiform stems a foot and a half long, and sparingly branched throughout and prostrate, forming open masses 2 to 3 feet in diameter, or spreading upward on bushes. Green but slightly hairy throughout. Upper part of stems with single umbels in the axils on capillary peduncles 2 inches long. Leaves with 1-3 pairs of leaflets about 1 cm. long. Leaflets linear but acuminate at both ends, and so having an elliptical outline, 1-2 mm. wide. Stipules and bracts reduced to minute deltoid brown scales, or a mere rudiment, but not glands. Flowers about 15 mm. long, with the bright banner dark-reddish-purple at tip, and wings and keel white. Flowers not showy, much scattered, one to two on the ends of the very long peduncles and on pedicels about 1 mm. long. Calyx about 7 mm. long, the subulate lobes half the whole, reddish, sparsely hairy, very hairy-ciliate on the margins and edges of the teeth. Pods 1.5 cm. long and 2 mm. wide, ashy and becoming smoothish, arched a little toward tip. This has the general habit of rigida, but is not silky-villous as in Bryanti, and pods wider, and leaflets never lanceolate. Growing in open places along with Astragalus Lagunensis among live oaks at 3,500 feet altitude in the Laguna mountains. March 1, 1928, No. 24271.

Ononis crotalariodes N. Sp. Perennial from spreading roots, erect, a foot or two high, leafy and with short internodes. Stems flexuous, striate, spreading-strigose with flat, jointed, twisted and glandular hairs, the gland terminal and oblong. Whole plant similarly pubescent except the white petals. Leaves 3-4 inches long, of about 7 pairs of elliptical to oblong leaflets, about 1 cm. long, which are seldom opposite, conspicuously serrate, finely raised-nerved. Stipules deltoid, green, deeply 2-5-toothed, parallel veined, fully 6 mm. long. Flowers 6-8 mm. long, single in the axils, on a stout peduncle 2-bracted in the middle, S-shaped and reflexed,

and about 1 inch long. Calyx lobes about as long as petals, triangular-acuminate. Pods sessile, membranous, 2 cm. long by 1.5 cm. wide, greatly inflated and cross section round, longitudinally oval, sharply deltoid-apiculate, sutures about equally arched. So far as I can find there is no species of Ononis native to Mexico. O pinnata is the only species approaching this in relationship. No. 23039, Tepic, Nayarit, February 14, 1927, in fields.

Cassia rotundifolia Pers. A prostrate herb from a woody root, about a foot high. Stems slender, racemosely branched below only, with internodes less than an inch long, and shorter than the leaves, sparsely pilose with long and spreading and straight hairs, with a few shorter glandular ones intermixed. Bases of the leaves similarly pubescent, but pedicels smooth, and pods minutely puberulent. Stipules triangular-ovate-acuminate and green, rather rigid, strongly 7-9 nerved and nerves parallel, and raised, 5-7 mm. long, closely appressed. Leaf with stout petiole about 4 mm. long, of two leaflets sessile and jointed to petiole. Leaflets apparently never united below, obliquely elliptical-oval and rounded, about 2 cm. long and 1 cm. wide, the mid-nerve not in the middle and having 3-4 nerves arising at the base on the outer side, all nerves raised and forming a raised network only near the margins. Leaves scarcely reduced above. Flowers single and yellow, about 5 mm. long, on capillary peduncles 1-2 inches long, and spreading. Legumes neary stipeless, linear, about 3 cm. long by 4 mm. wide, flat, many seeded, obliquely apiculate at tip and obliquely short-acuminate below, mostly straight, the valves opening and twisting as in Lotus. Seeds short-rectangular, about 3 mm. long, with square base, and tip apiculate on one corner, gray, close-set. This may not be a Bauhinia, but I know no other place to put it than here. No. 22483, Mazatlan, Sinaloa, November 20, 1926, growing in open places on slopes. This has the general characteristics of C. diphylla.

Aeschynomene vigil Brandegee. Shrubs about a yard high, rather intricately short-branched much as in Amorpha canescens, the leaves being clustered on the last few inches of the hoary twigs. Pubescence closely appressed on the stems, and dense, much less so on the leaves, of slender and flexuous hairs. Leaves about 2 cm. long, rather hoary, of 4-5 pairs of oblong leaflets, about 8 mm. long, obtuse to emarginate, with the midrib off from the center, and the central leaflets the largest, the terminal one often twin. Flowers in very short axillary racemes, 1 to 3, sessile near the ends of capillary peduncles, which are not over 1 cm. long. Flowers very dark-purple, with yellow-tipped keel, the banner hairy and about 5 mm. long, and very broad. Calyx strigose, with triangular-subulate lobes. Legumes of 1-3 joints which are half-rhombodial, the stipe side straight, reticulated, sparsely short-hairy, almost contiguous, about 5 mm. long and 3 mm. high. No. 24260. Miraflores, Lower California, February 28, 1928. This plant is very poorly described by Brandegee in Proc. Cal. Acad. Ser 2 Vol. 3 128.

Aeschynomene glomerata N. Sp. Near to A. petraea Rob. A shrub 4-6 feet high, branched above in fascicles. Stems slender and smooth. on both sides, which are very obtuse or rounded at tip and oblique at

base, venose and with midrib in the center, 2-2.5 cm. long and about 8 mm. wide. Old leaves falling as the flowers come out. Petioles about 2 cm. long. Flowers golden-yellow, not striped, about 1 cm. long, in short compound racemes an inch or two long, which are densely clustered. Stipe, pedicels and axis densely spreading-short-hairy. Calyx thin and light-green, about 5 mm. long, turbinate, the teeth about half the whole, rather oval, becoming apparently triangular and spreading in fruit, somewhat pubescent. Fruit of about 4 joints, 8-10 mm. long by 7-8 mm. wide, half-oval to oblately so, the ventral one somewhat arched, becoming glabrous, but puberulent when young, finely reticulated, the terminal one with a conspicuous triangular beak, the basal joint about as long as the stout and straight stipe. No. 23057, Acaponeta, Nayarit, March 1, 1927, at El Tigre mine, growing among live oaks. The conspicuous thing about this species is that is a rather tall and slender shrub, with mid-nerve of leaflets in the middle, and leaves falling as the flowers come out, leaving the stems leafless, and the large tufts of golden-yellow flowers. Ae. petraea Rob. is poorly described, and is said to be annual. Standley in the Shrubs and Trees of Mexico says this species is a shrub. Ae. glomerata is a closely related species at least.

Inga megacarpa N. Sp. Large shrub or small tree about 20 feet high. with rather slender branches and gray bark, leaves at first very thin and papery, becoming about 6 inches long and nearly as wide, with about 5 pairs of twin leaflets arranged on the rachis alternately, and then light-green, smooth and shining on both sides and with raised mid-nerve, rather leathery, about 7 cm. long by 3 cm. wide, elliptical, obliquely and triangular-acute, each leaflet in the pairs appear almost as the half of an oval, leaflets split in the middle. Mature pods rarely more than two on a woody peduncle about an inch long and over ¼ inch thick and similar to the branch from which it arises. Pods 10-12 cm. long by 4 cm. wide, and 3 cm. thick, chestnut-colored, oval in cross-section, with the ventral suture raised as a ridge, obliquely rounded at both ends, the surface reticulated and shining and smooth. Walls about 3 mm. thick and very hard and woody. Interior of pod is filled with a cellular pulp which incloses the seeds. Seeds about three, black and smooth, somewhat flattened and about 1 cm. long, and round. Pods very heavy, a little arcuate, that is not symmetrical. The leaves of this are constructed much after the fashion of Pithecolobium dulce. No. 23012, Acaponeta, Nayarit. February 25, 1927. Growing on hills.

Phascolus sanctorum N. Sp. This species has the pods more resembling Phynchosia than is usual, but the seeds are several, which would throw it in Phaseolus. A slender perennial, climbing over bushes, a yard or more long and with elongated internodes and inclined to have two peduncles in the axils, sparsely ashy-pubescent at least when young. Leaflets 3, very broadly rhomboidal and about as broad as long, fleshy and with broadly cuneate base, acutish, triple to quintuple nerved, on petioles hardly longer than the terminal leaflet. Peduncles longer than the leaves, striate, one to few flowered. Flowers not 1 cm. long, yellowish but with tips somewhat colored. Calyx almost rotate and very broadly short-lobed.

Pods falcate, 2 cm. long, inclined to be a little wider above, about 5 mm. wide, somewhat flattened, smoothish except on the margins, very shortly-stipitate, about 6-seeded, triangular-acute obliquely, broadly linear. Valves closely twisted in age after splitting off. Seeds nearly round, about 3 mm. long, flattened laterally and with margins cross-ribbed, yellowish. No. 24141, Todos, Santos, February 19, 1928.

Caesalpinia Blasiana N. Sp. Slender shrub with gray bark, with short branches. Leaves 1-2 dm. long and wide, dark-green above and somewhat lighter below, smooth, except when young, and then with very short hairs and minute glands on petioles and rachis and pedicels. Plant unarmed. Leaves even-pinnate, with 2 pairs of pinnae which have about 4 pairs of ovate to ellipitcal leaflets 2-3 cm. long, but 1 cm. wide, rounded at tip and shortly cuneate at base, strongly 1-nerved. Flowers few, in racemes in the axils of the leaves, on pedicels 1-2 cm. long, ascending. Pods about 6 cm. long by 3-4 cm. wide, very flat and chartaceous, with strong borders, rounded at tip and very shortly-cuneate at base, on a stout stipe about 5 mm. long, chestnut-colored, smooth and shining, splitting tardily along the sutures, with 2 seeds, flattened and about 1 cm. wide. This seems to be related to C. platyloba Watson. No. 22987, San Blas, Sinaloa, January 28, 1927.

Acacia Mazatlana N. Sp. Slender shrub, several feet high, erect and widely branched, spineless, copiously leafy with smooth leaves about 2 dm. long, evenly bipinnate, with 2-3 pairs of pinnae, and the pinnae with 3 pairs of diamond-shaped leaflets which are shining above and lighter colored below and veiny, 3-4 cm. long by 1.75 cm. wide, shortly acuminate to acute at both ends, with a few scattered hairs in the veins and base. Petioles rather stout, about 4 cm. long, glandless or with minute and scattered papillate as if glands. Stipules minute. Inflorescence a raceme of umbels, the lowest umbels subtended by small leaves. Peduncles of the umbels about 2 cm. long, horizontal. Umbels about 6-fruited, the stamens reddish and innumerable and free. Flowers not seen. Pods very flat, 4 cm. long by 1 cm. wide, oblong, with often wavy outline, flattened between the seeds, shining, apiculate at tip, and cuneate at very base, tapering into a stout stipe 1 cm. long. Valves splitting off flat through a part of the stipe. Seeds about 6, 3 mm. long, nearly round, mottled, brown. This has pods much like those of A. filicina, but leaflets entirely dissimilar. No. 22430, Mazatlan, Sinaloa, November 20, 1926, on hills. This seems to belong to the class of A. Rosei Standley but apparently quite distinct.

Lupinus Lagunensis N. Sp. Section Platycarpos. Perennial, about a foot high, erect, smooth except for a few scattered hairs on the stems and leaves. Petioles filiform, 2-3 cm. long, a little larger than the leaflets. Stipules small and subulate and mostly attached to base of petiole. Leaflets about 5, oblanceolate, about 2 cm. long, apiculate at the rounded tip, acuminate below, 3-4 mm. wide; thin. Peduncles terminal, 2-4 inches long. Bracts small, subulate, deciduous. Pedicels filiform, about 5 mm. long, ascending. Flowers about round, nearly 1 cm. long, white and with bluish borders. Calyx deeply lobed, the upper lobe with wide sinus to the middle and with triangular lobes as long as tube, lower lobe entire and

green. Banner oblately round, 5-7 mm. long, with sides reflexed to the middle, a little shorter than the wings and keel which are very broad. Pods oblong, shortly-acute, a little contracted between the seeds, 2-ovuled, sparsely hairy, flat. No. 24270, Laguna mountains, March 2, 1928, growing along river bed. A unque member of the Platycarpos section.

Lupinus Bartolomei N. Sp. Annual, growing in tufts from a single root, 3-4 feet high and wide, erect, much branched below. Stems flexuous, terminating in a single raceme 1-2 feet long. Leaves light-green, almost smooth except for a few white hairs on the nerves, about 5 cm. long, on slender petioles a trifle longer than the leaflets. Leaflets 2-3 cm. long, oblong-oblanceolate and rounded at tip, and acuminate below, thin. Bracts subulate, thin, deciduous, 4-5 mm. long. Pedicels hoary with appressed white hairs, about 5 mm. long, filiform, ascending. Flowers about as broad as long, 5 mm. long, white with margins tinged with purple or pink. Calyx with upper part hyaline and deeply and broadly cleft, the lobes much longer than the tube. Lower lobe green and entire. Petals smooth, the banner oblately rounded and with sides closely reflexed, a little over half as long as the wings and keel. Wings very broad, net-veined at the ear. Keel the half of a square. Flowers very many in a long raceme, inclined to be whorled. Pods ascending, 2 cm. long by 5 mm. wide, flattened, 5-seeded, sparsely short-shaggy, constricted between the seeds, flat- and deltoid-beaked. Seeds rounded, flattened, mottled with purple areas, about 3 mm. long. The first impression of the plant is that of an exaggerated L. concinnus without the pubescence, the pods being similar, and the color of the flowers the same, but the erect and bushy habit quite different. Growing in drifting sand at the crossing above San Bartolomo and at the springs near by. No. 24163, February 27, 1928. Plants probably nearer L. affinis.

Lupinus rotundiflorus N. Sp. Stout and tufted perennials from a woody root. Softly and rather sparsely short-hairy throughout except the smooth petals, on the stems are some longer silky hairs, the leaves being little more than finely puberulent and greener above. Very leafy and erect plants with thick stems branched above. Petioles 2-3 times as long as the leaflets, sulcate. Leaflets 3-5 cm. long and about 1 cm. wide, narrowly elliptical, apiculate at tip and shortly acuminate below, about 7, strongly ribbed, very many. Racemes very dense, rarely 6 inches long, on short, striate and stout peduncles. Stipules linear, grown to the petioles for 3-4 mm. in length, the rest free, 2 cm. long. Flowers round, blue, 1 cm. long. Calyx deeply cleft, almost to base, and lobes entire. Pedicels 3 mm. long and slender. Bracts setaceous, about 1 cm. long, deciduous. Banner oblately round, a little shorter than the wings and keel, which are about 7 mm. wide. Young pods reflexed, yellow-strigose with appressed hairs. No. 23041, Tepic, Nayarit, February 10, 1927, on hillsides.

Phyllanthus orbiculatus Muell. No. 23 Jones, Colima, Colima, July 5, 1892. Though this is not in fruit it so closely resembles this species that I refer to it here. The species has not yet been reported north of the Amazon. Phyllanthus Pringlei Wat. P.A.A. 26 147 appears to be the same. This also was not in flower or fruit.

In Brandegee's Phyllanthus peninsularis Erythea 7 8 1889, got by Anthony as his No. 364, we have specimens of the type labeled in Brandegee's handwriting, there appear to be two species under this name in the type. Standley refers P. peninsularis to P. Galeottianus. A part of the type is manifestly P. Galeottianus, but most of Brandegee's description is taken from the rest of the material and seems to be a distinct species and should stand. The chief characters are in the oblong-ovate leaves, sharply acute and widest below the middle, in the pods being subtended by 5-6 nearly orbicular and green and thick and leaf-like calyx lobes about 4 mm. long, appearing as if a whorl of leaves, and in the sharply triquetrous seeds having flat faces with irregular worm-like cross ridges. This is my No. 24489, got at the first ranch out of Todos Santos, on the road to La Paz, and just opposite the house at the south. P. Galeottianus is my No. 24485, got on the slopes of the Laguna mountains, March 2, 1928. Both species grow about a yard high, forming inconspicuous bushes.

Euphorbia eriantha Bth. The plants referred to this species by Brandegee do not accord with the description in Bot. Sulph. 51 in several particulars, but Brandegee collected the species in the type locality in fine condition, and his specimens correspond well with my own from Todos Santos. The plant is a woody rooted perennial, a foot to a foot and a half high, from a thick base. The leaves are 2-3 inches long, and mostly 2 mm. wide and entire and acuminate or triangular-acute, flat, and with scarcely a petiole, the floral ones inclined to be a little thickened at base and pinkish. There are many floral ones in a whorl which form the conspicuous part of the plant, there are a few stem leaves lower down but inconspicuous. The flowers are about 3 mm. long and hardly reach the base of the fruit at maturity. The appendages hardly 1 mm. long and rather rudimentary, the whole flower hoary with rather dense and very short hairs. The pods are exserted a trifle from the flower on a stipe, and are 6 mm. long by 3 mm. wide, nearly round in cross section but 3-sulcate, blunt, oblong, ashy with closely appressed and very short hairs, and pendulous or spreading. The seeds are also oblong, 3 mm. long by 1.5 mm. wide, a little flattened and obscurely 3-sided and with rounded edges, a little narrower above than below, with straight sides, and raised white blotches which under a high power show pits, blunt at both ends. The hilum is excavated a little and with the caruncle raised on a short pinnacle, and flat and cellular, and round-reniform in outline and about 1 mm. wide, and is easily broken off. This is my No. 24107 from Todos Santos, February 12, 1928, growing in waste places or open spaces. I have seen it at the Cape and La Paz. It is said to contain a large quantity of rubber.

Euphorbia geniculata Ortega. Annal, erect and with widely spreading branches from the base. Leaves 2-3 inches long, alternate, mostly smooth but ciliate on the margins, conspicuously hastate in the middle with upturned teeth, then mostly below tip are two broad sinuses, and then again sometimes hastate at base but with smaller teeth. Lighter colored below and inclined to become reddish above, on petioles about 1 cm.

long. Flowers small, in a flat and terminal head, much shorter than the stout stipe of the ovary. Fruit so deeply divided as to form almost three follicles which are smooth, somewhat laterally flattened and with elliptical cross-section, and almost reniform in outline. Seeds oval-ovate, acutish, almost round in cross-section but with three obscure keels, truncate at base, the hilum depressed, surface covered with minute warts or tubercles. Seeds a little over 2 mm. long and 2 mm. wide, dark-reddish. This plant is allied to E. heterophylla, but the leaves are quite different, and the seeds different. No. 23325, Tepic, Nayarit, Februry 14, 1927, in waste places in fields, appearing as if at one time an immigrant. The poor description of the species in DeCandolle Prodromus makes it uncertain if this is the species, but the seeds are similar. Hemsley also mentions the species as occurring in various parts of eastern Mexico.

Euphorbia gladiosa N. Sp. Low shrubs a foot or two high, but blooming the first year, dichotomously branched below, and stems inclined to be racemosely branched above. Smooth and shining throughout, inclined to be erect. Leaves opposite, about an inch long, rather rigid and flat, greenish and with a long central and purple blotch above, lighter colored below, an inch long by rarely more than 5 mm. wide, normally triangular-acuminate from a very oblique and half-cordate base, rarely a little serrate on the bulge below, in the younger plants the leaves are sometimes linear. Stipules setaceous and lacerate and white. Stems very slender and toward the top becoming capillary. Lower cymes rather dense and on filiform peduncles an inch or two long and either in the axils of leaves or opposite a leaf when one is wanting. Flowers normally half a dozen in a head or cyme and the cluster subtended by two leaves. Usually there are two clusters of half a dozen flowers, one cluster on each side of a single long-stipitate involucre which is red, obpyramidal as in Eriogonum umbellatum, and 2 cm. long, and with tips ciliate. Appendages orbicular, entire, very white or reddish and hardly 1 mm. long, about one-third as long as involucre. Fruit smooth, deeply 3-lobed and with rounded edges, about 2 mm. long, slightly exserted. Seeds about 1 mm. long, oblong acute, square in cross-section, with rather sharp angles, with about 6 wavy and anastomozing cross-ribs which form rather deep pits, and which go through the angles. The general habit reminds one of E. corollata, but not so erect. Lower stems reddish. No. 22613. Guaymas, Sonora, November 2, 1926.

Euphorbia strigosa H. & A. Bot. Beech. 310. This very poorly described species is somewhat better described by Boissier in DC. Prodromus Part 15 2 p. 73, but even there is unsatisfactory. Whether my plant belongs to it I do not know. Erect perennials from running rootstocks. Stems 1-2 feet high, erect, simple, slender, minutely pubescent above. Leaves alternate, ascending, 3-4 inches long by rarely an inch wide, oblong-lanceolate, acuminate, mostly acuminate below, on a stout petiole rarely 5 mm. long, entire, rough with a minute and appressed white pubescence. Stems ending in a single black-purple cluster subtended by 3-5 brilliantly colored red-purple bracts which are 2-4 inches

long and lanceolate and either wholly colored or half colored and then green to the tip. Involucres about 3 mm. long, broadly campanulate, very dark, and with rudimentary glands. Fruit exserted twice as much as the length of the involucre, depressed-globose, about 5 mm. long, deeply 3-lobed, with divisions rounded on the back and not keeled, smooth. Seeds globose-oblong, 3 mm. long, round and not angled, gray, with slightly raised areas, shining. This grows scattered among the grassy slopes. No. 23310, Tepic, Nayarit, February 14, 1926. In case this proves to be different from E. strigosa it may bear the name E. nigro-purpurea.

Euphorbia floccosiuscula N. Sp. Plant annual and prostrate, with capillary stems intricately branched, and with rather short internodes. Whole plant softly pubescent with excessively fine and cobwebby hairs which are widely spreading and inter-mixed with gland-tipped ones and about 2 mm. long, much as in E. villifera. Leaves elliptical, oblique, opposite, the largest about 5 mm. long by 2-3 mm. wide, entire, and rounded, most of them very small. Flowers axillary and single, minute, red, on slender pedicels. Involucres narrowly cuneate in outline, and about 2 mm. long. Appendages small and lacerate. Fruit slightly exserted, nearly as long as wide, emarginate, deeply lobed and with angles rather sharp, about 2 mm. long, pilose. Seeds reddish, oblong-ovate, ½ mm. long, acute, sharply angled and with concave sides a very little rugose. Plants a few inches long and very delicate. No. 22739, Hermosillo, Sonora, October 27, 1926, in open places on slopes.

Diospyros Californica Brandegee. Guayparin. Shrubs not over 20 feet high, in clumps. Trunks white or gray, a foot wide, nearly erect, branched above. Twigs stout. Leaves evergreen, oblong-obovate and acute, rough, shiny above. Fruit about an inch wide, truncate above and so oblately spherical, green, smooth, at maturity a chocolate-black and quite soft. Tastes sweet and is good to eat. Seeds about 8 and about 1 cm. long and hardly half as wide, yellowish. It grows on the edges of sandy washes on the plains, or on gravelly slopes in the mountains. On the plains it grows with Parkinsonia, and the like. It has the bark of an oak and is a rigid shrub. I found it on the plain west of La Paz 14 miles. Also at about 3,000 feet altitude on the Laguna mountains. The fruit has a rather sickish taste and a person would not naturally eat much of it.

Papaya Carica. At La Paz Mrs. Meyer had this growing in her garden. It had been planted a year and nine months, from the seed, and was 15 feet high, with a trunk 6 inches in diameter, and was copiously fruiting. It therefore is the most rapid grower, except the bamboo. I also saw it growing at Miraflores and at Todos Santos. I had previously seen a tall tree of it at the El Tigre mine east of Acaponeta, and ate the fruit there.

There are two species of bamboo grown in western Mexico that I saw, vulgaris and aculeata. Both grow at San Jose del Cabo. There is a clump there of aculeata that is 75 feet high and covers a quarter of an acre. The poles are sometimes 6 inches thick.

Yucca australis. This is the plant that Goldman calls Y. valida in his report. It is occasional in the brush everywhere, but west of La Paz 14 miles it forms forests. The general aspect of the plant is bluish, and in the brush is 2-10 feet high, but out on the plain becomes 30 feet high. It is loosely stoloniferous and with slender stems nearly erect. Leaves are 1½ feet long, somewhat ascending, glaucous-bluish above and dark-green below, nearer apple-green, long-acuminate above, a little contracted below, thin, very concave, not over 2 inches wide, very many, and with bases closeset, not with threads on the sides. The uppermost 1-4 feet of the top of the trunk is covered with these leaves which in age become reflexed and which sheath the stem almost to the very base. The trunks are never more than 4 inches thick. Panicles a foot and a half long, sesile, with widely spreading branches. Fruit apparently pendent, very sweet and with pulp ¼ inch thick. Seeds thick, rugose, black. No flowers seen. Got near Todos Santos, January 31, 1928. Prefers sandy soil, not in washes. On the big mesa west of La Paz are forests of it. There the leaves are from half a foot to 2 feet long and with fine threads. The trunks are always slender and never big as in Y. brevifolia.

Yucca australis var. valida (Brandegee). Yucca valida Brandegee. This plant is manifestly not an ally with Y. brevifolia (arborescens), but is a very arid form of the common australis which is markedly different from brevifolia in the flabby leaves and slender trunk.

Washingtonia filifera var. Sonorae. W. Sonorae Watson. The attempt to keep up this species by Parish and Standley on the petiole character is abortive. The tip of the petiole is never "obtuse." It is always acuminate from a deltoid base, varying much. The more obtuse forms are young plants. For the most part the trees in Mexico are not allowed to have the leaves from the thatch that they would do normally because they cut them off for thatching houses. This thatch is about that of the var. robusta, but the trunks are those of normal filifera. The threads are very variable. The first flowers come out in a sheathed cone with tapering tip, longer than the leaves. The trunk is rarely a foot thick in the tall trees, the trees get as high as the cocoanuts, and are mostly covered their entire length with the dead petioles, but there are a few trees that are self-pruning. The leaf blades are about 3 feet long, barerly or fully as long as the fully armed petioles which are deltoid to linear-triangular at the tip. The segments are broadly linear-acuminate, and the outer half of the segment is pendent and vibrating in the wind, and often whipped to threads in age. The trunk never stolons, and will average a foot in diameter. It grows in sweet soil (not alkaline), where it is quite wet, the same kind of soil as the dates and cocanuts grow in. It begins to bloom in March. At La Paz the roots go down to the tidewater.

Sida ampla N. Sp. Slender and erect shrub or herb 4-6 feet high with paniculate inflorescence many flowered. Leaves cordate-ovate-acuminate, 1-3 inches long, rather thick and densely and minutely and velvety-pubescent with stellate hairs becoming yellowish, palmately 5-7 nerved, on

slender petioles half as long, rather doubly low-serrate, much lighter-colored below, rather scanty. Panicle leafy throughout the main branches, which are mostly racemosely compound and with smaller leaf-like bracts. Flowers nearly sessile, the calyx globose-ovate, about 5 mm. long, densely hoary as are the leaves, and with appressed lobes ovate and acute and with raised margins and midnerve making the calyx very strongly 10-angled since the lateral nerves run down into strong angles in the sinuses. Petals apparently yellowish but not developing or vespertine. Carpels half as long as calyx, about 3 mm. long by 2 mm. wide, half-reniform, triquetrous in cross-section, rather flat on the back, and shortly hairy and rugose. The empty tip thin but not produced much. The single seed triquetrous, chestnut-colored, smooth and hard. No 22858, Acaponeta, Nayarit, February 25, 1927, and El Tigre mine, March 1. This appears near to S. cordifolia L. but sufficiently distinct.

Kosteletzkia bracteosa N. Sp. Slender shrub, 6-8 feet high and widely branched. Leaves thin, 1-2 inches long, triangular-ovate, acuminate, sharply serrate, truncate to cunate below, not lobed, sparsely stellate-hairy below, on a petiole about 1 cm. long. Flowers single in the axils of the upper leaves, on long peduncles about twice as long as the leaves. Bracts about 8, linear, nearly an inch long, green, ascending, equaling the petals, which are dark-purple, and which surpass the stamens. Fruit globose, hispid above, with single long-hairy seeds. San Blas, Sinaloa, February 1, 1927. No. 22863.

Lopezia globosa N. Sp. Slender and erect annuals, widely and openly paniculate and with very slender stems rscemosely and scatteringly flowered above with a single flower in the axil of each leaf. Leaves elliptical to ovate, inclined to be erose on the margin and when young sparsely strigose-hairy, as are the younger parts, thin, 1-2 cm. long, acutish, on petioles 2-3 mm. long. Pedicels capillary, widely spreading, about 2 cm. long. Flowers in bud about 5 mm. long and broadly linear, dark-purple and smooth, with ovary globose and constricted at very tip. Calyx split nearly to the base, and with the 4 lobes equal and widely spreading in anthesis, falling entire at maturity. Abortive stamen appearing stiff. white below and pink above, half-obovate-arcurate, on a short stalk and often with a green spot on the inner upper corner, about 2 mm. long. Petals 4, one of them longer and rather oval in outline, crumpled or erose on the margin, white, on a long stalk, the other three petals purplish, with much the same shape but laciniate. Anther on the perfect stamen linear-arcuate and acute. Petals nearly twice as long as the sepals. Pods globose, about 3 mm. long, splitting at tip into 4 recurving segments. This species appears nearest to Rose's Pelozia laciniata but differs in the Semeneiandroid capsule. Tepic, Nayarit, February 9, 1927. No. 23299.

Lopezia laciniata (Rose). Pelozia laciniata Rose Cont. Nat. Herb. 12 296.

As to Rose's Pseudolopezia I am not prepared to say, but I think

too much stress is laid by him on deviations from typical Lopezia, and that the deviations are only specific and not generic.

Linum gracilentum N. Sp. Very weak and slender annual, ascending to erect from a decumbent base mostly. Branched below. Stems rounded, but with a few vertical lines or striae. Internodes 2-3 times as long as the leaves. Leaves about 1 cm. long, thin and flat, acute, oval-ovate, in fours, 1-nerved. Whole plant smooth except the upper stems and pedicels, which are hairy, margins of upper leaves, bracts and sepals cilate with very short and gland-tipped hairs, but no evidence of glandular substance exuded. Stems terminating in small and copiously flowered corymbs a few inches long and wide, with capillary branches. Pedicels and subulate bracts about 3 mm. long, and as long as the acuminate-triangular calyx lobes, which are incurved over the depressed-globose capsules. Lobes hyaline but with three green nerves. Flowers lemon-yellow, and about 4 mm. long. Stamens elongated. This plant belongs to the Greggii group, but seems to be undescribed. No. 22882, Tepic, Nayarit, February 15, 1927, growing in open slopes.

Dendromecon Piercei N. Sp. Shrubby-based perennial, mostly biennial, with ascending stems 2 feet high and tufted and little branched, ending in few flowers on erect peduncles. Flower buds spherical and about half an inch wide and like the rest of the plant glaucous. Sepals 2-3, round, imbricated, tardily deciduous, reflexed in anthesis and very concave. Petals like those of Eschscholtzia Californica but of uniform lemon-yellow color throughout, about 1.5 inch wide. Stamens about 50, and half as many as in Romneya and twice as many as in Eschscholtzia. Ovary ending in a contraction or very short style which is terminated by a peltate stigma which is concave above and inclined to be rectangular or 2-lobed, and white, much as in Dendromecon rigidum but not so conspicuously 2-lobed. Leaves those of Eschscholtzia Californica but lobes very narrowly linear. Fruit a 10-striate linear capsule like Dendromecon. This plant Mr. Pierce informs me was got originally in a package of seeds sent him as Eschscholtzia Mexicana. It has been growing in his garden for over five years and reseeds itself regularly, and breeds true. It therefore cannot be a hybrid. The leaves are wholly unlike Dendromecon, and the habit is that of an Eschscholitzia, but the stigma and sepals are very different. The sepals of Eschscholtzia are calyptrate, that is united at tip and pulling off as the flower opens. The stigmas are linear-subulate and in the larger flowers a cm. long, and erect. The stigma of Dendromecon is flat and 2-lobed and rather stipitate. The stigma of Romneya is that of Argemone and Papaver that is radiate, sessile and of 10 parts flat on the tip of the capsule.

Tournefortia Tepicana N. Sp. Shrub 6-10 feet high, with slender branches and copious leaves. Stems spreading-strigose. Leaves about 1 dm. long by 4 cm. wide, elliptical, shortly acuminate, rounded to truncate at base, entire, ashy with appressed white hairs which are brownish and more prominent on the nerves. Petioles stout and 1 cm. long. Inflor-

escence terminal, pyramidal, compound, of many clustered and short and scorpioid racemes seldom an inch long. Flowers white, about 5 mm. long, slightly funnel form, the hairy tube 4 times as long as the very broad lobes, and 2-3 times as long as the calyx whose lobes are linear and longer than the tube. Whole flower short-strigose with yellowish and appressed hairs. No. 23134, Acaponeta, Nayarit, February 26, 1927, growing on slopes and hills.

Evolvulus ramulosus N. Sp. Apparently an annual or short-lived perennial, ramulosely branching and straggling over the ground, with innumerable and rather capillary branches with short internodes. Leaves oval to oval-ovate, 1-2 cm. long, on a stout petiole about 3 mm. long, softly and finely appressed-silky-pubescent with long and white hairs, as is the whole plant, including the corolla. Pedicels 4-6 mm. long and reflexed and capillary. Sepals ovate and acute, about 2 mm. long and as long as the widely open and blue corolla. Pods depressed globose, a little longer than the sepals. Seeds globose-ovate, green, smooth. No. 23135, Tepic, Nayarit, February 12, 1927. Growing in open places.

Ipomoea equitans N. Sp. A closely twining and perfectly smooth vine, with long internodes. Leaves very deeply cordate-ovate and shortly acuminate, 1-2 inches long by an inch wide, entire, with the sinus completely closed and edges overlap and equitant on the elongated peduncle which is nearly 1 dm. long. Petiole very stout and 2-4 mm. long, occasionally with a few long hairs. Flowers in a twin cyme and then appearing as if on a one-sided raceme on eachbranch, with minute bracts. Pedicels 1-2 cm. long, capillary and enlarged a little upward. Flowers an inch long, orange, funnelform, about half an inch wide above and gradually enlarged upward. Calyx split to the base, with trangular lobes nearly linear and 3 mm. long and green, spreading in fruit, smooth. Fruit oval, 5 mm. long, smooth, apiculate. Seeds nearly oval, 3 mm. long, mottled, finely pubescent. Tigre mine near Acaponeta Nayarit, March 1, 1927. This would appear to be near I. Wrightii.

Buttneria trilobata N. Sp. Slender and erect shrubs about a yard high, with chestnut-colored stems racemosely branched above. Outline of leaves ovate to deltoid-triangular and 3-lobed, would be hastate if the lobes were sharp but they are rounded, about 4 cm. long by 2-3 cm wide, shortly acuminate, nearly equally crenate throughout, green, smooth but minutely papillose above, lighter below and very sparsely stellate-pubescent. Leaves reduced above. Flowers yellow, about 6 mm. long, in small umbels in the axils and without peduncle to the umbel. Fruits reflexed on slender pedicles not 1 cm long, nearly globose, sparsely prickly above the middle and prickles about 2 mm. long, fruit 4 mm. long, minutely roughened. No. 22538, Mazatlan, Sinaloa, November 20, 1926.

While botanizing in Mexico my attention was attracted to certain Onagraceae, such as Lopezia, and Semeiandra, in the specializing of parts. This was again recalled in studying various Godetias in cultivation last year. Now I find the same tendency in Clarkia elegans, and I do not discover any reference to these facts in any publications. The peculiari-

ties show a much closer relation to the Leguminosae than is commonly supposed. In the flowers of Clarkia elegans there is distinct asymmetry in the arrangement of the petals as though they had been derived from the papilionaceous corolla. The two upper petals seem to represent the wings of the pea flower, and the two lower ones the parts of the keel, the banner being absent. Then the stamens are declined below and ascending at tip as is the style. Then they are in two sets. The inner set of four is shorter by an anther's length than the outer, and the anthers are about 3 mm. long and white, while the outer ones are 4 mm. long and red. The similarity does not extend to the pods.

Hedeoma gracillima N. Sp. Apparently perennial from creeping rootstocks with stems mostly simple above the branching base and very slender and a foot long and weakly erect. Whole plant glabrous except the petioles are mostly retrorsely short-hairy, and the leaves and calyces have scattered rudiments of hairs. The mouth of the calyx within has a ring of white hairs. Leaves very thin, without evident resin dots, rhombic-ovate, acutish at tip and cuneate at base, entire or with few scattered and very low cerenatures, the blade 1.5 cm. long, with capillary petioles about as long as blade, and longer than the capillary pedicels. Leaves but slightly reduced above. Stems floriferous on the upper half or two-thirds. Flowers mostly two to a node, the pedicels reflexed and then abruptly arched upward and about 1 cm. long. Calyx 3 mm. long, triangular-cuneate and not swollen in the middle nor conspicuously closed at throat, the 5 ovate teeth about the same length and strongly 3-nerved and about 1 mm. long. Corolla tube not exserted, the lobes broad and reflexed, purple. Stamens 4, a little exserted, the anther cells divaricate to about 90 degrees and elliptical and attached by a broad connective. The lower stems are filiform and root at the nodes. No. 22849, San Blas, Sinaloa, January 28, 1927, growing on bottom lands along with Salvia lanceolata and other weeds.

Russellia. This genus as to Standley's Shrubs and Trees of Mexico is badly mixed. The character of 4-6 angles is found on the same plant, the young stems 4-angled and the older and larger ones 6-angled. Some plants, in fact all the plants I have seen, are pubescent between the ribs such as polyedra, Jaliscensis, Deamii, sarmentosa. Most of the species have ternate leaves at least in part. Standley fails to state that all the angles are raised into conspicuous rounded ribs, and the ribs are warty roughened when pubescent. His key is worthless in determining the species, and there seem to be at least twice as many species recognized as exist.

Pedicularis Tepicana N. Sp. Slender and erect herbs 2-3 feet high, branching above, and branches terminating in short spikes 2-3 inches long. Leaves narrow, the middle ones at least 1 dm. long, completely bipinnate, and segments cuneate-oblsnceolate and rarely 1 cm. long, the terminal ones twice as long as the lateral ones, all sharply apiculate with a callus tip, and scabrous. Calyx in fruit with tube 3 mm. long and equaling the subulate-triangular lobes which are ciliate on the margins. Corolla about

2 inches long, linear, too old, red. Pods twice as long as the calyx tube, oblong-ovate and abruptly acuminate. Seeds many, white, not ½ mm. long, oblong, with cellular coat raised about ¼ the diameter in a conspicuous honeycomb, the cells forming one to four rows. No. 23211, Tepic, Nayarit, February 15, 1927, on slopes along with Semeiandra.

Anisacanthus glaberrimus N. Sp. Plants wholly glabrous, and green except the young bracts and adjacent stems. Shrubs 3-5 feet high, with slender branches. Leaves elliptical, shortly acuminate at both ends, on a very short petiole a few mm. long, entire. Flowers in terminal and short or compound racemes, red, 2-3 cm. long, many. Bracts about as long as the calyx (2-3 mm. long), very shortly and deciduously pubescent, triangular. Calyx lobes linear. Corolla linear to the middle and 2 mm. wide, then quickly enlarging to 5 mm. wide. The lower lobes broadly linear and spreading, and nearly as long as the ampliate portion, the other erect. Pods about 2 cm. long, including the stipe, which is as long as the body, which is oblong and shortly acute at both ends. Seeds 2, circular and flat, 3 mm. wide. Anther cells linear and opposite. No. 22976, Acaponeta, Nayarit, at the El Tigre mine, March 1, 1927. This is the type, and has head-like racemes at the ends of the twigs and about 2 inches long, and single. I also refer here No. 23266 from the same locality, but with many short racemes in a compound cluster often 6 inches long.

Ixtlania acicularis N. Sp. and N. Gen. of Acanthaceae. Ascending perennials rooting at the nodes, a foot or two high, stems inclined to be bent at the nodes, sparingly branched, variably canescent with somewhat reflexed hairs which are jointed and flattened, and apparently with some minute glands intermixed, becoming smoothish. Leaves ¾ inches long by an inch wide, flat, leathery, shining above, lighter below and seemingly scabrous but really smooth though roughened by the raised cystoliths and nerves, elliptical, shortly acuminate, truncate to rounded at base, on a stout petiole 4-6 mm. long, entire. Flowers in clusters of 3-5, very dense spikes in each of the upper axils, much as in Beloperone Hassleri but hoary. Spikes about 1.5 cm. long, narrow, erect, of few flowers. Bracts linear-lanceolate and subulate-acuminate and acerose-tipped, hardly distinguishable from the subulate, hyaline-margined, acerose, plumose, calyx lobes, all about 1 cm. long and appressed. Corolla cylindrical, 8 mm. long, not ampliate above, the upper lip very short and erect, the lower of 3 almost round divisions 2-3 mm. wide, pink-purple, yellowish at the throat. Stamens just exserted, 2, each of a single anther cell with a conspicuous white ear at the base and oblong, then obliquely enlarged to a rather wide blade above as long as the proper anther cell which is twisted and rounded at tip. Filaments rather broad. The anthers resemble those of Nelsonia Anisostachya, but are conspicuously di_erent in detail. When I collected it I imagined it might be an Elytraria. The cystoliths place it definitely in the Acanthatceae. No. 23534, Ixtlan, Nayarit, February 19, 1927, growing in fields. Fruit not seen.

Monardella Lagunensis N. Sp. Rather dense shrub 2 feet high, racemosely branched above, each branch terminating in a single large head

about an inch wide. Leaves about 2 cm. long, by 1 cm. wide, elliptical-ovate, entire, obtuse, pubescent with short hairs on the nerves, acuminate into petioles about 4 mm. long. Stems and petioles short-pubescent with white and spreading hairs. Heads appearing smoothish, with elliptical and greenish bracts rounded on the outer ones and acuminate in the inner ones and inclined to be somewhat colored, closely appressed, hairy above on the nerves and feather-veined, inconspicuous. Calyx 1 cm. long, contracted at both ends and smooth below, sparsely pubescent above. Teeth about 1 mm. long, triangular and colored. Corolla white or only tinged with purple, the tube exserted a trifle beyond the calyx tips, then split into very narrowly linear lobes about 1 cm. long, which spread at right angles and are crumpled in the dried speciments, about as long as the filaments. Anthers 4. No. 24180, Laguna mountains, March 2, 1928. Growing on rocks on the mountain sides at 3,500 feet altitude.

Sphacele hastata Gray. This magnificent mint, with its bright red-purple flowers and glutinous inflorescence, is very conspicuous in wet places along rivulets in the Laguna mountains at 3,000 feet altitude. The leaves are from truncate-hastate to obcordate at base. The lobes of the flower are from two to three times as wide as long and very much rounded, to almost oblong. The floral bracts are cordate and leaf-like but short. The calyx lobes are subulate from a broad base, and the 3 upper ones are mostly twice as long as the other two,and calyx split deeper at the pseudo lobes. Brandegee reportsit from the San Francisquito mountains. The calyx enlarges somewhat with age and becomes 10-ribbed and with cross lines between the ribs, forming meshes. The seeds are flattish and shining black. I do not see any glandular disk below the seeds. There is a very considerable variation in the plants.

Lobelia regalis Fernald. Stout plants 2-3 feet high, much as in L. Tupa L., erect and mostly simple, floriferous in the upper axils, softly and minutely ashy-pubescent throughout even to the corolla and stamen tube. Leaves oblong-lanceolate, often 1 dm. long, acuminate, cuneate into a short and margined petiole, callus-serrulate on the margins by minute teeth about as long as the hairs, 2-4 cm. wide, gradually reduced above. Flowers solitary in the axils, on slender peduncles about 2 inches long. Calyx depressed-hemispehrical, about 8 mm. wide and 4 mm. high, with triangular teeth about as long as tube. Corolla fiery red, 3-4 cm. long by 5 cm. wide, split to the middle with all the lobes linear but the upper one, which is oblong. Anther tube 5-7 mm. long by 2 mm. wide, white, arched, with a tuft of stiff bristles on the end. Seeds minute, elliptical, with a very thin wing. No. 23197, Ixtlan, Nayarit, February 19, 1927. I also refer to this No. 23191, Tepic, February 10, 1927. This species at once suggests Lobelia Tupa L. but the leaves are not sessile, the anthers are white and not black and longer. This may be L. regalis Fernald, a poorly described species, at least it is near it.

Lobelia Cotensis N. Sp. Allied to L. appendiculata. This is one of the frailest of the annuals, erect, a foot or two high, simple below, the stem produced into a seemingly naked peduncle a foot or two long and

strict, and terminating a one-sided raceme which is very lax and open. Generally shorter and capillary racemes arise from the uppermost one or two axils, having flower or two on them. Proper stems rarely 4 inches long and with half a dozen internodes shorter than the very thin leaves. Lowest leaves very small and rarely an inch long, reniform-ovate to ovate and acuminate and finely toothed. Middle leaves the widest, 1-2 inches long, cordate-ovate to almost round, sharply lacinate-dentate to shallow-crenate on the same plant, all on capillary petioles nearly as long as blade, or longer in the lower leaves. Uppermost leaves inclined to be lanceolate-acuminate and 2 inches long, and cuneate below and sharply laciniate toothed, the petiole short. Leaves not reduced upward but terminating abruptly at base of peduncle. Bracts linear, green, inconspicuous. Pedicels capillary, 1 cm. to 2 inches long, inclined to be hooked at the top. Flowers sky-blue, delicate, about 1 cm. long. The lower lobe very broadly fan-shaped and 3-lobed, 5 mm. long by 8 mm. wide. Upper lobes 2, spatulate, ¾ mm. long, spreading. Corolla tube surpassing the calyx lobes by 3-4 mm., mostly white, produced below into a conspicuous spur, 1-2 mm. long, which is encased in the distorted base of the calyx, which is really the other half of the calyx thrown back into a knob and then produced again into 2 green and subulate-lienar lobes (2 mm. long) standing at right angles to the calyx tube, the whole reminding one of a serpent's jaw widely distended. The anthers just reach the end of the corolla tube, are blue, and with the usual tuft of white bristles at the end and 2 mm. long. Capsule not seen. No. 24147, Cota ranch, 14 miles east of Todos Santos, at the base of the Laguna mountains, February 21, 1928, growing in the shade of trees along with Lyocarpa Xanti, and other annuals in loose soil. I also refer here No. 24365 from the eastern side of the Laguna mountains, March 2, 1928, and No. 24366, San Bartolo, February 27, 1928. The plant is quite common, but evanescent. The Laguna mountain specimens have the lower lobe of the corolla split to the base into three broadly obovate lobes. The upper calyx lobes are about as long as the lower.

Galium nitens N. Sp. Allied to Rothrockii. Shrubbery at base and intricately branched with very slender stem a foot or two long, smooth and shining throughout except the fruit. Leaves in fours, about 1 cm. long, strongly 3-nerved and with sides revolute, linear but a little wider above, acerose-apiculate, a half to a third as long as the internodes. Flowers apparently single in the upper axils. Divisions of the fruti about spherical, 1-2 mm. long, roughened all over by minute triangular and sharp processes like rudimentary hairs. Nogales, Arizona, October 23, 1926. No. 22352.

Houstonia asperifolia No. 24010 Flowers pink-purple. Corolla lobes 4, broadly spreading, ovate, longer than the 4-angled tube. Stigmas 2, exserted or inserted. Stamens 4, one form on the throat of corolla, the other form half way down on the tube and connivent at tip, linear, straight, when discharged filiform and blue-purple. At the insertion of the stamens are black-linear lines or stripes 1 mm. long between the

insertions. Plants growing in desert places where it is very dry. other respects.

Verbesina grandis N. Sp. Tall plants 6-8 feet high, coarse and widely branched and with very large leaves, 1-2 cm. long, with deltoid to ovate outline, and inclined to be hastate-lobes in the middle and with erose margins, thin, minutely and densely roughened by yellowish hairs all over, acuminate, rounded below into a very broadly winged petiole an inch long, which wing is decurrent on the stems. Stems nearly smooth, striate, thick and hollow and winged throughout to the tip of the inflorescence. Inflorescence completely corymbose and of very many heads about 5 mm. long. Scales imbricated in 2-3 series, the outer green and oblong-ovate to triangular and acute and ciliate and nerved and appressed, the inner thinner and more hyalina and oblong-lanceolate, and puberulent, disk-scales linear and puberulent above. Rays oblanceolate about 5 mm. long, yellow. Stamen-tube black, and white at tip, exserted. Akenes 2-3 mm. long, the body linear and flat, inclined to be black and smooth. Wings a little corky next the seed then thinning out to a paer edge and lacerate above, wider than the body, white, produced above and decurrent into the slender awns, and making the whole seem deeply obcordate. When over-ripe the heads appear squarrose and with conspicuous awns. No. 23420 Tepic, February 14, 1927, and No. 23421 Acaponeta, Nayarit, February 26, 1927. This species seems near to V. alatus.

Perezia foliosa N. Sp. Plants very leafy, with short internodes and leaves overlapping and appressed. Plants appearing smooth throughout, but lower side of leaves lighter colored, minutely scabrid with rudimentary hairs, which on the veins are longer. Veins and veinlets raised on both sides of the leaves. Leaves about 1-1.5 cm. long and 2-3 cm. wide, somewhat leathery, linear-lanceloate to oblong-lanceolate and acuminate, inclined to be narrowed below and eared at the sessile base, closely and spinulosely short-toothed with rounded sinuses, and with a continuous raised margin all around. Heads 2-3 in the uppermost axils of somewhat reduced leaves, a little over 2 cm. long and obconic, and a little wider than long and purple-tipped, as are the flowers. Bracts lanceolate-acuminate and acerose-tipped, papery, very many, smooth, appressed. Flowers barely surpassing the bracts, purple, one lobe about twice as long as the others. Pappus scanty and of very long and capillary hairs almost as long as the flowers. Akenes black, linear, covered with raised glands. No. 23358, La Barranca Nayarit, Februry 21, 1927, on prairies. Stems tufted and herbaceous, and about 2 feet high and erect.

Mexianthus Robinson. I saw the type of this genus at Berkeley in June, before the genus was published. To all ppearances it was the same as my number 23419, got at Acaponeta Nayarit in 1927, a cursory examination. But on studying it microscopically I find my material is Eupatorium monanthum with the characteristic pappus of that genus, and the long and club-shaped stigmas. tI is rather curious that two genera should be so much alike and growing so near to each other. They remind one of Coulterella in the single-flowered habit, though not at all alike in

other respects.

Franseria. At Miraflores this is the most common Composite. It grows about 10 feet high, with acuminate leaves 6 inches long. It is a bad hay fever plant and abounds from the Cape north on both sides. It gave me a bad cold.

Franseria Bryanti Brandegee. This rather densely branched shrub is about 2 feet high, shrubby below. Was in full bloom January 31, 1928, at Todos Santos. It produced an enormous amount of pollen with a very strong odor that readily caused hay fever reactions.

Viguieria deltoides Gray. Shrubs allied to E. albescens; 8-10 feet high, tufted at base, with slender stems branching widely and gray-barked, forming an open and rounded outline, decidedly taller than the usual Encelia, with black center. Upper side of leaves shining and green, appearing as if smooth but really very rough with very short and stiff white hairs from a pustulate base but the hairs sparsely scattered, with veinlets rather impressed. The lower side of leaves lighter colored, and with rather more hairs somewhat longer and becoming hispid on the veins and nerves, but still very short, with veins and veinlets raised into sharp ridges. Leaves rhomboidal-ovate, obtuse, entire and with slightly revolute margins, 2-3 inches long by 1.5-2 inches wide, leathery, deltoid-cuneate below into a stout petiole about 4 mm. long, opposite, 3-nerved from the base. Internodes 2-4 times as long as the leaves. Inflorescence terminal, rather corymbiform (but really racemose), with single heads in the axils of reduced leaves below and on long peduncles, and the upper heads on shorter peduncles which are subtended by mere bracts. Heads with yellow disk flowers, and disk rather hemispherical. Heads 5-10 mm. wide and long. The ashy bracts linear, acutish, not over 1 cm. long, the outer ones rather spreading, all ashy but smoother at tip, and rough with minute hairs as are the nodes and petioles. Inner bracts subtending the akenes, linear, hyaline, greenish, waterlined and rather many nerved, a little lacerate at tip and pubescent there, longer than the involucral bracts. Rays oblanceloate, entire, yellow, about an inch long and widely spreading. Pappus of the ray a crown of lacerate-tipped scales about ½ mm. long and without awns. Pappus of disk flowers of two strong palaeaceous awns which are hispiduloua and about 4 times as long as the crown of scales (the same as in the ray). Akenes flat, silky-hairy all over, black. This species and the other Encelias are the chief source of sticks for the panoche crates of the Mexicans. The wood is hard and strong. This is No. 24126 from Todos Santos. It grows on the slopes of the hill southwest of Todos Santos, and is rare. The induration of the base of the scales is a myth. I think the separation of Vieguieria from Encelia is altogether too artificial.

Zexmenia epapposa N. Sp. Plants with the habit of Heliomeris multiflora, slender, about 2 feet high and sparingly branched throughout, rough-hipid with appressed white hairs. Leaves closely and finely serrate, acuminate-lanceolate from a triangular base, and nearly sessile,

about 2 inches long, opposite, thick. Heads terminal on filiform peduncles 2-4 inches long, generally with 1-3 short and leaflike bracts,, then with a series of oblong and rather scarious bracts with greenish tips, then others more scarious and incllined to be lacerate at tip. Outer akenes inclined to be flattish and with two wings, the other two angles acute but not winged, the face very warty. Inner akenes 4-winged and 4-angled and less warty, all about 3 mm. long and elliptical-obovate, without pappus. Rays yellow, oval, 2-3 mm. longer than the bracts, heads about half an inch high and hemispherical. No. 23394 Acaponeta Nayrit, near the El Tigre mine, March 1, 1927.

Cacalia Tepicana N. Sp. No. 23357. Tepic Nayarit, February 10, 1927. Strict herbs 4-6 feet high, erect and simple stemmed, leafy, purple stemmed and angulate as are the petioles, deciduously somewhat pubescent on younger parts, but leaves smooth and shining but lighter colored below, veiny. General outline of leaves is nearly round and 3-4 inches long, shallowly angulate-dentate with 6-8 teeth which are much wider than high, and with few rudimentary teeth on the margins. Midrib of leaves dissipates quickly into 4-5 pairs of stout veins near its base, and these veins branch on the outer side into one or two others, and sinking into veinlets at the tip. The tip of the stems dissipates into small and long-peduncled panicles in the axils of the upper leaves, which are somewhat reduced, the whole plant ending in a rather large panicle. Heads about 5 mm. long, of about a dozen flowers, with very white pappus, the scales at length widely spreading, linear and obtusish. Growing on gravelly and prairie-like slopes.

Melampodium hispidum H. B. K. This is seemingly closely related to Hemiszonella Durandi, but plants without glands or glutinous pubescence. Leaves and bracts ciliate with stiff and white hairs, and surface of leaves with scattered hairs. Bracts thin and oval, about 3 mm. long, barely as long as the akenes, which are obliquely oblong-obovate, much flattened, truncate in cross-section on the back and without warts, with sides with scattered and sharp warts but no glands. Tip depressed-truncate. Corollas yellow, much recurved and setose-hairy below, less than 1 mm. long, pappus none. Otherwise as in H. Durandi. Plants 6-12 inches high, erect, growing in waste places. Nogales, Arizona, October 23, 1926, No. 22681.

It is evident to me that Hemizonella of Gray is a part of the genus Melampolium.

Melampodium Durandi is Hemizonella Durandi Gray.

Melampodium minimum is Hemizonella minima Gray.

Both the above species are closely allied to Melampodium hispidum H. B. K..

Shrubs and Trees of Mexico by Standley. This is a voluminous annotated list of Mexican aboreous plants, but cannot be called a shrub and tree flora for the descriptions are inadequate. It shows great haste in compilation, and a very cursory study of the species given, and yet is very helpful in many ways. When we come to a thorough examination

of the genera we find the work quite unsatisfactory. For example: Schrankia, a genus with over half a dozen Mexican species, is not given at all. When we come to the palms we find Standley knows nothing about Washingtonia or Erythea, just follows published species, but shows no study of either genus, or has any conception of the real generic characters if there are any. But he recognizes all the published species as good, when in fact probably not half of them are any good. The same treatment is accorded the persimmons species. From his book no one knows whether there is one species or nearly half a dozen. As to geographical distribution he is all at sea, showing very little knowledge of the distribution of plants in Mexico. The fact that most of Mexico is in the Tropical life zone, and that distribution is more a matter of humidity and accident, adds to the confusion.

ADDITIONAL U. S. NOTES.

Iva Nevadensis Jones. Dr. Asa Gray, in the Synoptical Flora 247 says of this, "but Akenes not 'finely striate.'" Anyone who has ever put the akenes of this species under the microscope knows that they are finely striate, Gray to the contrary notwithstanding, and there was no occasion for this outburst just because I dared to publish my own species in my own way. Gray was first, last and all the time a gentleman, except in such cases as this when we printed our species without consulting him, and then he was a boor. His attack on Buckley for coining new names for Nuttallian species, though justified, was a case in point, and he did not hesitate to misstate things then.

Berberis Fremontii Torr. In the Botany of the Mexican Boundary, page 30, Torrey gives the type locality as western Texas and New Mexico, and in his description he gives the berries as blue. What should have been his type is the material got by Fremont on the Virgin river, western Utah, and adjacent Arizona and Nevada, and this material never has blue berries. They are light-yellow, normally decidedly inflated, and rarely red. Occasionally they are full of pulp and then red and make fine preserves, but for the most part are punctured by an insect and bladdery. I have seen millions of specimens of it and never yet saw a solid berry. It is certain that in his description Torrey confused B. Wilcoxii with his type.

Crossosoma Bigelovii Watson. The type of this species was got on the Bill Williams river, which is the first draw south of the Chimhuevis mountains, Arizona. I got material of the species in the latter place in full flower. My material would correspond well with Robinson and Fernald's C. parviflora, for the flowers are quite small. Material got by myself and others in the Catalina mountains, Arizona, have flowers twice as large, and the twigs well developed and making the leaves scattered and not fascicled. The petals in this form are cuneate-oblanceolate. In the form referred to here from Whitewater, California, the flowers are the same size as the Catalina form, and petals oblong-oblanceolate, and half

an inch long, white at first and becoming purplish toward the tip on the outside, widely spreading and evanescent. They seem to be mostly 5. The foloicles so far seem 2, or rarely 3. The stamens about 20. In all the forms of this species the leaves are about half an inch long and elliptical, and soft and spongy and very smooth, and entire and acute or acutish, they have a tendency to be a little enlarged above or below, enough so as to be called oblanceolate or lanceolate at times, but the normal form is elliptical. There is a peculiar feel of the leaves that is also noticeable in Paeonia, which is evidently a related genus. The stamens seem to vary somewhat but never less than 15, nor over 30. This year the species is in full bloom, February 24, 1929, at Whitewater, California, which is somewhat below 1,000 feet altitude. The ecological locality is friable and very recent volcanic flows, of about the consistency of Cretaceous sediments, on slopes along with Juniperus Californica, Eriogonum fasciculatum, Eriocoma cuspidata, Nemophila and Phacelia, and Echinocactus acanthodes. The stems are almost black toward the tip, rigid, short-branched above, subspinose, tortuous, tufted, 2-3 feet high and scraggly. The flower buds are depressed-globose, and 5-angled, and cuneate at very base. The disk is flat, fleshy or leathery, and 6 mm. wide, and on it arise unevenly the 15-25 stamens, whose filaments are round and capillary and about 4 mm. long and erect. The broadly linear yellow anthers all attached about two-thirds the way down to the filaments, and the cells are divaricate mostly at the base almost to the middle, they split from the bottom upward but not to the tip. The stigmas are depressed-capitate and almost sessile and with a furrow parallel to the septum. The follicles are sometimes 3. Flowers fully an inch wide to an inch and a half. The petals are attached to the disk just inside the angle of the calyx lobes. Calyx lobes round, much cupped, greenish-white, very obtuse, very closely reflexed in anthesis, about 4 mm. long. The petals are very thin and entire and rounded at tip. The leaves of the Whitewater form in flower are closely fascicled, the outer ones obovate, the inner ones oblanceolate, frequently the outer ones are retuse. The whole plant is perfectly smooth. The pedicles are about half an inch long, and single. I think Robinson is right in referring C. parviflora to Bigelovii, for the species is decidedly variable. I think this is the first time that the flowers have ever been studied fresh.

NOTES ON CARYOPHYLLACEAE

Arenaria quadrivalvis R. Br. seems the same as A. verna.

Arenaria obtusiloba Rydberg is A. Sajanensis.

Arenaria aequicaulis Nelson is A. verna var. hirta, and seems the same as A. propinqua Rydberg.

Arenaria macrantha is Sajanensis.

Stellaria was published in 1753, L. 272. Alsine was proposed by Tournefort 126 but no species published. The same in L. Gen. No. 380. Then Alsine was displaced by Stellaria in L. Gen. No. 568. The first species referred to Alsine was media (L. 272). Kew Index states that Alsine media L. is not Stellaria media but Spergularia media and if that

be true then Alsine is not a synonym of Stallaria, but when we consult the Species Plantarum we find that Alsine media is described as having bifid petal, which refutes the Kew Index statement, and makes it a synonym of Stallaria. The only other species on which Alsine could stand is segetalis, which is a Spergularia. Now out of the 275 names recorded in Kew Index under Alsine only two of them, media and nemorum, could stand, all the others being referred to other genera or hynonyms. Alsine has almost universally been considered the same as Arenaria, but the two species on which it stands are Stellaria media and Spergularia segetalis. Strict priority requires the displacement of all the names of Stallaria for a single species of Alsine.

Drymaria. It is evident that those who have treated this genus hitherto know very little about it. I find that the shape and markings of the seeds are valuable as are the sepals and habit. Robinson in Syn. Fl. p. 253 under one star says "Cauline leaves rather broadly ovate." He should have added "or wider."

Silene multinervia Watson is like a pediceled form of Gallica, the seeds are the same, but ribs of Calyx are 15-20. It seems nearest to conoidea but the seeds are quite different, and calyx ribs more. To me it looks like a hybrid between Gallica and conoidea.

Silene concolor Greene is S. Pringlei Wat.

Silene simulans Greene is laciniata Cav.

NOTES ON RANUNCULACEAE

Ranunculus Austinae is very nearly typical glaberrimus, and so is ellipticus Greene.

Ranunculus Eschscholtzii. O. D. Allen's No. 97, distributed by Harvard as Suksdorfii, has sharp lobes but otherwise is Eschscholizii. No. 2669 Elmer from the Olympics is the same. It was distributed as Suksdorfli. Synonyms of this species are eximus Greene, alpeophilus Nelson, Helleri Rydberg, saxicola Rydberg, ocreatus Greene, Utahensis Rydberg.

Ranunculs vicinalis Greene is pedatifidus.

Ranunculus glaberrimus has as synonyms R. calthaeflorus Greene, inamoenus Greene and Populago Greene.

Ranunculus unguiculatus Greene is alismaefolius.

Ranunculus stenolobus Rydberg is adoneus.

Ranunculus arnoglossus is alismaefolius.

Ranunculus Earliae is occidentalis.

Aquilegia. This genus has been tampered with considerably lately, and without any attempt to grow the proposed species. There seem to be only two primary species in the genus in America, Canadensis and caerulea, and from these all the others seem to have arisen in very recent geological times, so recent that the species are not fixed. Theoretically one would not be inclined to think that flowers would divert to yellow, but actual study of growing plants shows this is the case. Another fact is that the yellow flowered forms prefer open sunlight more, and hot areas where there is abundant soil moisture. Red flowered forms occur in middle elevations, and blue flowered forms at high elevations. The use of

the term elevations is meant to cover not actual elevations as much as relative ones, that is, plants of the Lower Temperate life zone represent the lower elevations: Plants of the Middle Temperate life zone represent the middle elevations and plants of the Uppr Temperate life zone represent the high elevations. At the far south yellow flowered forms occur in the lower edge of the Middle Temperate life zone in the Sierra Madres of Chihuahua, such as A. Skinneri and chrysantha.

Aquilagia Laramiensis is flavescens, oreophila is caerulea, caulifax is formosa, elegantula is formosa, pallens is a form of caerulea, rubrocincta is formosa and so is triternata and lithophila. Tracyi is truncata, Wawensis is formosa and so are pauciflora and Columbiana. As I have stated previously Waston erred in stating what was his type of A. flavescens. His actual type was the high altitude form which is a hybrid between the actual A. flavescens and caerulea. What should have been his type was his No. 36, which he referred to his species as a high altitude form, and which I have taken as the type of my A. depauperata, which plant is not a high altitude form at all, but which he got in what is now called Pleasant Valley in City Creek canon, Salt Lake City, at an elevation of about 6,000 feet above the sea. He gives his elevations as 5,000 to 7,000 feet altitude, but was mistaken in saying that any Aquilegia grows at 5,000 feet altitude. I have gone all over the region with a barometer and know there is no such elevationwhere the plant grows. I think that about the only way to settle the name is to use it as a hybrid or to drop it altogether. On the contrary truly typical material is widespread in Idaho and corresponds well with his Wasatch form, which surely is a hybrid there, but the Idaho material cannot be a hybrid in Idaho. It is rather unique that Payson in his monograph reduces my depauerata and keeps up Laraminensis.

CORRECTIONS.

Page 159 Stallaria should be Stellaria.

158 foillcles should be follicles.

131, under Jussiaea clavata, add to last line " 22879, Tepic, Feb 11 1927.

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